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EDITORIAL COMMENT

Surprisingly the completion of this issue marks the completion of five years of publishing Computer New 80, and our tenth year of publishing the Construction News. Many of you may know that we also publish several weekly news letters related to the construction industry. We started in 1983 and purchased our first Model 4 which was just being introduced by Tandy/Radio Shack after a long six months trying to use a Color Computer and a tape recorder for the job. Using a CoCo for this type of work was better than a typewriter, but proved to be too undependable for the kind of work that calls for a weekly deadline. So we stuck our neck way out and bought a $2000 computer from Radio Shack called a Model 4. That was in 1984, and we have been learning how to use the thing ever since.

If you read the classified section you will see an advertisement by Construction News Publishing Co. which we ran in the November issue of "Home Office Computing" magazine. It is our offer to provide for a fee the "how-to-do-it" information on setting up and running a Construction Bid Reporting Service. The purpose of pointing it out to you, aside from the fact that we run our entire business operations using nothing but Model 4 computers and associated software, is that since we are offering this opportunity to anyone interested in setting up a Bid Reporting Service, we thought that we would be remiss if we did not offer the same deal to our CN80 readers who might be looking for ways to use their computers in making a very good living. If you are interested, check out the ad in the classified section and drop us a note.

December

1992

Happy Holidays

New Programs

MINE FIELD by Richard VanHouten

Author of ANSITERM4 and many other fine programs.

Announcing Mine Field, the first fully serial mouse-aware program for the TRS-80 Model 4! Try to clear a mine field without setting off the mines. Five levels of play, from simple to suicidal. A mouse and mouse driver is NOT required for play, the program will recognize the absence of the mouse driver and take input from the keyboard only. $12 + (Y) S&H.

(*Editors Note*) With or without a mouse this is a fun program, it could be just as addictive as Tetris, try to get across the mine field without setting one off, which could end it all. If you are into games this is one that you will want to have. Besides nothing new for the TRS-80 in the game area has been released for a long time and we hope that this will stimulate more programmers to put their game cap on and write some more, especially with mouse support. -Ed.

THE OLD AND THE NEW

by Robert W. Via

In the November 1992 issue of Computer News 80, the staff was kind enough to introduce the "multimedia" program I wrote around December 1991 for Symphony 90 player and graphics board. Much of credit for the program goes to Steve Jerkins, the originator of the program for the Model III. Each year in December since 1990, I have uploaded a file to Compuserve for users to try for different accessories. In 1990, I rewrote a menu program by Ken Taczala for Model 4 users with hard drives to allow easy access to all the programs we hide out there and forget about. This year I wrote a Model 4 version of the MS-DOS BBS analog clocks called WATCHES. It contains four cute clocks for users with graphics boards, and hopefully, a clock chip.

ABOUT THE MENU PROGRAM

(December 1990)

This program is quite complex in that it allows you to instantly access 72 commands fairly easily. The nicest feature is that the menu will return after execution of any program. It's also simple to exit and re-enter the menu at any time. Users with several floppy drives can find it beneficial too. And those of you with LS-DOS 6.3 will be able to boot-up to the hard drive and into the menu program with a simple startup JCL. All I do is leave the boot-up disk in floppy drive zero and when I turn the computer on, the system powers up to the hard drive, switches the hard drive to logical drive zero, and boots up the menu without a keystroke. It comes in a self-extracting archive complete with documentation, blank menus, the program, and for those who like to experiment, the assembly code is included. I have been using it for two years now and haven't noticed any bugs or program conflicts. I have included an update to the menu modification program that does a better job of keeping everything straight on the menu. (This modification is not on the Compuserve file.) The menu has been tested with TRSDOS 6.2 also. Since most people with hard drives also have clock chips, it displays the time with a good morning, afternoon, or evening greeting as appropriate. Maybe some of our programming wizards could add a feature for mouse operation.

WATCHES

In my last edition of the File Cabinet Catalog, I combed the pages looking for an analog clock similar to the "Watches" programs many of the MS-DOS BBS's have. I checked all the TRS BBS's I could reach, and no good analog clock could be found. In this self-extracting archive are four watches: Mickey Mouse, Snoopy, Cheryl Tiegs, and a Rolex.

The watches themselves are a High Resolution file (/HR) that you can modify with a graphics draw program such as MDRAW II. The programs are written in Grafyx Solutions' GBASIC for easy modification. (I started writing a /CMD version and got sidetracked before I finished.) So Merry Christmas 1992. Hope I can think of something for next year!

-Robert W. Via

(Editors Note) The watch programs are really quite surprising to see, and very well done in a professional style. We tested them with a Model 4 that has the ROMCLOCK installed and they worked perfectly. These programs would be a great teaching aid for that pre-schooler or just a great screen to leave on your computer while your off having that coffee break.

These programs will be available from the File Cabinet.

Watch programs are on M4HRZ24
Menu programs are on M4UTL65

Leonard Lorden has submitted a program that will add or subtract line feed characters from any ASCII file, which is also on Volume M4UTL65.

MINE FIELD AND OTHER SUBJECTS

by Richard VanHouten

I've managed to pull myself away from the '386SX clone and its games long enough this month to get some programming done for our favorite machine. Hardware scrolling for the Tandy hi-res board and loadable, user-customizable fonts have been added to ANSI-Term 4. I've also released Mine Field, the first fully serial mouse aware game ever written, as far as I know (see announcement elsewhere in this issue). Unlike other mouse-oriented programs like MDRAW, which requires you to have the mouse driver loaded before running, Mine Field will run flawlessly even if no mouse driver is loaded... you just won't be able to use the mouse as your input device. With 5 levels of play, you can choose from a quick game that's easy to win, or a long game that will really test your logical skills, and that is very difficult to win, or somewhere in between.

Stan tells me that people are still wondering why they should use ANSI-Term 4 rather than some other terminal program, even after my article and Gary's review in the September issue. Well, the main reason is graphics... ANSI-Term 4 is the only way short of replacing your character generator to display IBM-PC graphics, which the vast majority of BBS's and BBS-based games use. With anything else, you're going to get what resembles a collection of more-or-less random characters on your screen. Another reason is the number of lines displayed... with 28 lines, you can see more than the standard PC screen (25 lines) rather than less as you would with any text-based terminal program. A third is its good VT100 emulation, for those of you who use your 4's as terminals to mainframes or mini-computers. Lamar Owen did a test of VT100 emulations, published several months ago in TRS-Link, and ANSI-Term 4 did the best job of those that he tested. There may be other Model 4 terminal programs that he didn't test that do a better overall job than ANSI-Term 4... but I doubt that they are still available.

Leonard Lorden asked me about programming the serial port recently on the TRSMOD134 Fidonet echo recently, and since this may be of general interest, I will repeat the reply with code that I sent to him here:

The message from Leonard Lorden to me read:

Richard,
I could use some help manipulating the RS232. The tech manual isn't too clear on how to do specific things. For example, I IN port X'EA' to check for data received, do I need to clear this data, and if so how?

The act of reading port 0EBh clears the flag in port 0EAh.

I'm also having problems figuring out how to initialize baud rate. I believe that a 16 bit code is required to init the baud rate, do I do this by sending two OUTs (low & hi) to X'E9' after sending any value to X'A8' (master reset), or do I send the low to X'A8' with the high sent to X'A9'?

You don't need to do a master reset to change the baud rate. The baud rate values fit into a nibble, and the receive and transmit values are packed into one byte, with the receive in one nibble and the transmit in the other (I don't know which is which, and it isn't very important, since I've never come across a situation where they had to be different.) Examples: 1200 bps =

77h, 2400 bps = 0AAh. The master reset is needed before changing the word parameters in port 0EAH.

I've written a quick little program that does nothing but print to video what incomes to the RS232, but so far it isn't working properly. I load XT4 to init the modem, call a board, then load up the monitor to see if it works. I scan the X'EA' for a data received flag, and then print the character in X'EB'. Thanks in advance... Leonard

My reply to Leonard follows:

Your problem might be using XT4 to do the initialization. It's ill behaved. Try using FastTerm or VT100. Or try this mini-term:

```
        ORG     3000H
TERM    OUT     0E8H,A      ;Master reset
        LD      A,6CH       ;8 bits, no
                            parity, 1
                            stop, DTR
                            and RTS
                            active
        OUT     0EAH,A
        LD      A,0AAH      ;2400; use
77h                         for 1200 or
                            55h for 300
        OUT     0E9H,A
MAIN    SVC     @KBD        ;check
                            keyboard
        JR      NZ,NOKEY    ;go if no
                            keystroke
                            ready
        CP      80H         ;check for
                            BREAK
        JR      NZ,NOBRK
        SVC     @EXIT       ;exit on
                            BREAK
NOBRK   LD      C,A         ;save
                            keystroke
WAIT    IN      A,0EAH      ;test if
                            transmit
                            buffer empty
        BIT     6,A
        JR      Z,WAIT      ;wait until it
                            is
        LD      A,C         ;retrieve
                            keystroke
        OUT     0EBH,A      ;send
                            keystroke to
                            remote
NOKEY   IN      A,0EAH
        BIT     7,A         ;test if
                            received char
                            ready
        JR      Z,MAIN
        IN      A,0EBH      ;read
                            received
                            char
        LD      C,A
        SVC     @DSP
        JR      MAIN
        END     TERM
```

The above code is off the cuff, untested, and released to the public domain.
Expansion of SVC macros, dealing with such things as line feeds, and other enhancements is left as an excercise for whoever wants to use it.

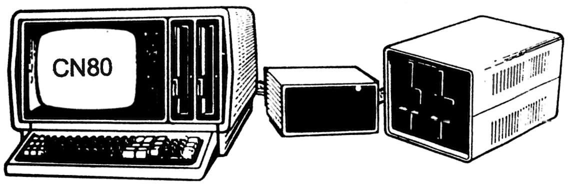
(end of reply)

This is an absolute minimal dumb terminal program, capable of full duplex operation only, but it illustrates how to access and program the various ports of the RS-232 interface. The same code would work on the Model 1 or 3, with the appropriate operating system calls substituted for the SVC's, since the Model 3 interface is identical to the Model 4 interface, and there are only minor differences (from a programmer's point of view) between the Model 1 and 3 interfaces.
-Richard VanHouten

REMINDER

If the last four digits on your mailing label are 92/12, then this is your last issue. Time to get your renewal in the mail.

Moving?
Remember to send us your new address.



External Floppy Drives Connected to your Model 4P
No internal wiring. Just Plug the I/O-Bus in, plug
the external floppy drives into it and run.

Add an external disk drive to your 4P with an I/O-BUS with no solder and no FUSS.

A VISIT WITH DAVID GOBEN

by David Goben

DESKMATE NOTES

Radio Shack's DESKMATE package for the Model 4 is a brilliant potpourri of simple applications. Unfortunately, often they were TOO simple, and more often than not, too limited. As supplied, it contained a text editor, spreadsheet, database, telecommunications package, calendar time scheduler, and a messaging system. The limiting part was that they restricted the amount of memory you could use, and made no attempt to access extended memory above the standard 64K. Thus the spreadsheet program, which otherwise was a very capable worksheet (even considering its limited functions), it was greatly hindered by its paltry workspace, which is less than 5.2K. Unfortunately, without a total rewrite, there is no way to expand this buffer.

The neat part is that a selection system as what DESKMATE represents could be written quickly that would overcome these limitations. It would be even better if several authors could get together and produce the package, each concentrating on one application. Perhaps even provide the ability to add applications, or upgrade them. But like so many "neat" ideas, few people would buy into them, and so making such a project pointless in producing. If there is enough interest, perhaps there is also an aspiring author out there who would like to produce it. The possibilities of such a project are limitless, and would be in line with most people who are application-oriented, and don't want to really know anything about their DOS. Fact is, with most of the many new people on board CN80, a lot of units would be sold, meaning $$$ in your pocket. Add that to your resume. How about it?

GEMINI 10 PRINTERS

When working for 80 MICRO magazine with Beve Woodbury, we thought we had heard the last of the complaints from Gemini 10 printer owners. Well, fresh complaints are now coming in, unfortunately it is always directed at the software products, instead of their printers. The problem with these printers is that when you begin printing with them, for some unknown reason, the first page will always have an extra line printed. Software products that supported these printers got around this by printing 1 less line for the first page only. I did hear from one person who got around this by issuing a TOF (Top of Form) command before going into his application. This cleared up the problem for him, but I'm not sure if it is an all-around cure-all, or if it cures the problem only if one document is printed, not more. All I know is, I can dump a page of text that is exactly 66 lines to one, and sure enough, 67 lines (an extra blank line at the start of the page) is printed, making 67 lines.

The Gemini 10 has always been a harbor for problems because it claimed Epson compatibility, but that did not seem to mean 100% compatibility, which it is not. What fascinates me is the number of Gemini 10 owners who know that their printers lack full compatibility, but will still complain that an Epson driver does not work well with it, except for simple functions. The Gemini 10's manufacturers were inundated by so many problem reports that they dropped production of the model, and produced an enhanced version. I believe that these carried the Gemini 10 name with a lower-case character extension. I understand that the upgrade was simply a printer ROM change which eliminated the bugs in the original ROM, of which the extra line problem was only one of the bugs in it.

Considering that the Epson 9-pin and 24-pin standards are indeed =the= dot matrix printer standards, and considering the low cost of fully Epson compatible 9-pin printers, such as the Seikosha SP-2400 9-pin printer (Epson and Seikosha are subsidiaries of the Seiko company), and the Seikosha SL-90 24-pin printer, both available through CN80, that it might be better and less frustrating to simply upgrade your printer to full compatibility. Not too many years ago, these printers with equal capabilities sold for over $2400. Now they are within easy reach of most pocket books. Amazing what mass production can do toward lowering product cost.

TANDY IDIOSYNCRASIES

Tandy produces some fine equipment, no doubt about it. But one thing that burns me is that for one reason or another, they connect devices differently. For example, for me to get a Tandy DWP230 to work on an IBM-compatible computer for some students at the university, I had to modify their standard ribbon connector. For whatever reason, Tandy chose to reverse the use of pins 31 and 33 on their printers. Everyone except Tandy leaves pin 33 unconnected and pin 33 set to the INIT line. Tandy exchanged these pins. I suppose this is so that the average non-knowledgeable user will spend $40 for one of their ribbon connectors.

The second bit of irritation I had was recently when I hooked one of my Tape Backup systems to my uncle's Tandy 1200. This computer was a gift to him so that I would quit hearing his tales of woe because this or that XT-compatible program would not work on his 80% compatible Corona Leading Edge (Trailing Edge) computer. For some reason or another, Tandy chose to reverse the pin assignments on their floppy connectors (or do we blame Tandon, its manufacturer?). If you look at any other computer, you will notice that they always have pins 1 and 2 oriented the same way. Except Tandy. They reversed them. The solution to this problem is to forget pin 1 on the ribbon when attaching it to the header connector for plugging into the computer (the connectors for the floppy and tape drive connectors should remain in place as they originally were). However, when it comes to plugging it into the computer, I had to strip off the pin 1 lead, and then insert the ribbon into the connector with all other leads shifted 1 up, so that lead 2 connected into the position for pin 1 on the connector. This solved the problem.

Unfortunately, This reversed pin approach goes all the way back to the TRS-80 Model I computer, and on through the Model 4, including the connections for the external disk drives. This is unfortunate, because when one goes about making a new ribbon for an external drive, it must be attached in such a way that will bring cries of condescending reprimands from those who think that they know everything (but don't). How many times do I (and especially CN80) have to hear someone castigating CN80 for creating "incorrectly" oriented cables? I suppose the cure would be for those people to try connecting the cables the way they claim the "should" be connected, instead of just talking about it, and then wonder why their disk drive lights stay on, and why they all of a sudden cannot access the drives.

NEWDOS/80 FORMATS

I began using NEWDOS/80 V1 when it first came out for the Model I. Later, when V2 came out for the I and III, I purchased it as well. It was a complicated DOS, requiring strange syntax entries to accomplish the tasks I desired, but it had many powerful features that I did not find elsewhere. When I bought my Model 4, I believe I spent the first 9 months using only the Model III mode under NEWDOS/80. I moved on to TRSDOS 6.2 once I realized the much easier syntax and friendlier system interface. For once having been a die-hard fan of NEWDOS/80, I can now say that I will never go back to it. Only after having realized how much easier it is to program for LDOS and LS-DOS, and even to use the system interface, have I realized that my love for NEWDOS/80 was only an illusion, the affection held because that had been the way I had learned to use a DOS. Even now after all this time, I know that there are still die-hard NEWDOS/80 fans out there (especially because they still write to me demanding products for their DOS, which I don't comply with for reasons of the standards-be-damned approach NEWDOS/80's author had).

One demand that is most common is for a way to overcome the complicated, much-hated PDRIVE specifications. I know people who will play around with PDRIVE's parameter commands (simply because they can), and so will create truly bizarre disk formats, format a disk, save valuable data on it, and then change the PDRIVE parameters to another format to access another disk, but in the meantime forgetting what the PDRIVE settings were for the previous disk. It is like putting a lock on a disk and losing the key.

But hope is not lost. Although NEWDOS/80 owners have been crying for a solution since NEWDOS/80 V2 came out, the answer is so simple that it can be considered a beginner assembly language project. Strangely, the normal users of NEWDOS/80 are hackers and assembly language programmers. Why then do they all complain that this task is impossible (a true programmer never admits that anything is impossible. If it is, then it will take them a couple more days to solve it).

The key to solving this problem is to be aware of 3 basic things. 1) The permanent PDRIVE data is stored on track 0, sector 2 of the NEWDOS/80 disk. 2) The PDRIVE data is stored in RAM in 10-byte blocks starting at address 4291H. 3) The system call to read a sector at the "lump" (track) stored in register D, sector offset in E, to the 256-byte buffer pointed to by HL, on the drive number stored in register C is 45DBH.

The procedure will be outlined here in skeletal form. Obviously improvements can and should be made to make it less prone to errors. For the sake of simplicity, I will use the most minimal code to do the task. An ambitious NEWDOS/80 programmer may wish to take my code and enhance it, and perhaps submit it to CN80 for distribution on their Disk Series disk so that other NEWDOS/80 users can take advantage of it.

The first step is to establish an origin and a buffer for the program. This can be accomplished with:

```
  ORG 5200H
BUFFER DEFS 256
```

The next step is to obtain a drive number. Suppose we called our program NDLOG (For NEWDOS/80 LOG), and we used it in the form NDLOG x, where "x" represents the new drive to log on. We could use the following code to obtain the entered drive number, and exit if it is illegal:

```
NDLOG:
  LD A,(HL)
  CP 13+1
  RET C
  SUB '0'
  RET Z
  CP 3+1
  RET NC
```

Notice that we aborted if a drive number was not entered, if the number was greater than 3, and if the specified drive number was 0. We should not try to log drive 0.

Once we have a legal drive number (NEWDOS/80 2.5 hard disk users will have to investigate the addresses I mention to ensure they are usable on their system), we should set the drive number to register C, and, because now would be a good time to do so, we can calculate the dump address:

```
  LD C,A
  LD B,A
  LD HL,4291H
  LD DE,10
  ADD HL,DE
  DJNZ $-1
  PUSH HL
  PUSH DE
```

We saved both the dump address, and the block length, because we will be using them both later. Next we point HL to the buffer, and set DE to track 0, sector 2, and read the sector.

```
  LD HL,BUFFER
  LD DE,0002H
  CALL 45DBH
  JP NZ,4409H
```

Notice we jumped to 4409H, the DOS error abort vector, if we encountered a disk error. Note: A further test should be added in case you had inserted a Model I double-density NEWDOS/80 disk, which has a single density track 0. It is in this area that programming gets "fun".

The PDRIVE information stored on the sector takes up 16 bytes, starting at offset 0 for drive 0, and upward, through drive 9. However, the important thing to remember here is that the system stores only the first 10 bytes of the data in memory, and that the data for drive :0 on a disk specifies the disk's actual format, regardless of what drive you insert it into. Therefore register HL already points to the required drive information.

Finally, to set the new drive information, you would simply have to dump the 10 bytes of data pointed to by HL to the appropriate storage location for the specified drive. This can be accomplished with:

```
  POP BC
  POP DE
  LDIR
  RET
```

Obviously, there is a lot of room for improvement, and there may in fact be other addresses which I have not mentioned which utilize the remaining 6 bytes not transferred by the LDIR instruction. For example, byte offset 12 holds the TSR parameter value, offset 13 and 14 contain bit fields for the TI parameter, and offset 15 contains the TD value, less 1. The meaning of the 10 bytes moved should be left to the interested programmer to figure out (it's easy, so I will not let you cheat by me revealing them -- discovery is its own reward).

HD FILTER OR REPARTITION?

So far three hard disk users have asked me to write a filter for their hard disks to make the system think the partition has more cylinders, but at the same time maintain smaller granule sizes. The suggestion was made that "I" could use a scheme used by NEWDOS/80 in that it can emulate 10-sector tracks on actual 18 or even 36-sector tracks by doing a little math twiddling. The theory is to multiply the specified track count by the emulated sector per track count (10 in this case), and then divide it by the =actual= sector per track count to obtain the actual location on the disk.

The disadvantage to this NEWDOS/80 approach is that it has got to be the stupidest approach yet developed. That particular approach yields a need for NEWDOS/80's maddening PDRIVE command. It also requires additional computational code overhead, and renders a disk totally useless if you do not have a utility to recover the forgotten key PDRIVE parameters.

The best approach is to divide a hard disk into partitions which use less less drive heads than what it has. For example, on my 20Meg hard disk, it has 4 heads of 32 sectors each, or 128 sectors for all 4. Divided by 8 granules, this yields 16 sectors per granule. If you were to use a partition which used 2 heads instead, this would mean a cylinder with a length of 64 sectors, and granules with 8 sectors. Further, using only 1 head yields 8 granules with 4 sector apiece. Most current hard disk drivers allow you to do this, and using the other heads for other partitions. With drivers that can allocate partitions by both cylinder and by head, you can create various flavors of partition sizes and shapes (and remembering how you mapped them out for later reference).

DOTWRITER FONT FORMAT

Because of all the questions about my comments about DOTWRITER and POSTMASTER fonts, I will outline their formats to show you how they are stored on disk. This should get the programmers hopping.

DOTWRITER fonts were designed for being "displayed" on a dot-matrix printer. If they had been designed for a hi-res screen, their format would have been more like that of POSTMASTER.

DOTWRITER fonts are defined in groups of rows, stacked on top of each other. Each byte in each row represents 8 vertical dots, corresponding to the 8-bit graphics of Epson-compatible printers. Since these printers fire their 8 pins in vertical rows, this definition is perfect for printers. Character definitions are defined in blocks of a fixed length. Thus the characters "!" and "M" are defined in block of equal size (a separate width table allows a program to perform proper proportional spacing). The font header (the information stored at the beginning of the file) tells the user program how long each definition block is, how many bytes are in each row, how many rows are in each definition, and how many characters are defined.

The first 2 bytes of the file represents the byte length of each character. It also is the byte offset in the file to the first actual character, the "!". The block that would have been used by the space character data (of which there is no need for) is used to store information about the characters. This count is save in Intel format, meaning low-byte, high-byte order. Thus if you found 3AH and 00H in the respective bytes, this would indicate a value of 003AH.

The second 2 bytes of the file represents the number of bytes per row. Remember, each byte in the row represents 8 vertical dots.

The third 2 bytes represent a pointer address that is actually useless for any usage outside of DOTWRITER. I believe it points to the width table address, but since we would not normally be loading the file at the same starting address (635CH), we would have to calculate it by multiplying the block length by the number of characters defined, to obtain an offset to the width table.

The fourth 2 bytes represents the number of rows of bytes defined in the block. Thus a definition of 3 rows can represent a maximum of 24 vertical dots (3 x 8 vertical dots).

The fifth 2 bytes represents the number of characters defined. By multiplying this value by the block length defined in the first 2 bytes, you obtain an offset to the start of the width table.

The width table is defined after the last block, and the length of the width table in bytes is equal to the number of characters defined. The width of each character is in dots. Thus if the first byte of the width table, which corresponds to the space, is 14 (0EH), then 14 horizontal dots are used for a space.

To use this information directly from a disk file, rather than loading the entire file into memory, you will need to save the first 10 bytes of the file in a buffer, and a copy of the width table (which normally does not exceed 96 bytes -- for characters 32 - 127).

Example: Once you have stored the above-mentioned information in a memory resident table, you can point to any character's data in a file by doing the following:

Subtract 32 from the ASCII value of the character desired. If it is zero (representing a space), you do not need to look up a block position, so you simply use the space width value (1st byte of the width table) to use as a dot advance value. If it is any other value, multiply that times the byte length of each block. This yields the byte offset from the start of the file to the first byte in the desired block. Use the high order byte to use as a sector offset value to position the file pointer, and the low order byte to point to the byte offset within the sector. For example, suppose that the block length was 3AH and you wanted to get the block for the letter "H". The ASCII code for this letter is 72 (48H). Subtracting 32 from this gives us a value of 40. 40 times 3AH yields 910H. Thus we would look on relative sector 9 for the start of the block, at offset 10H.

You will also need the row count, and the number of bytes per row. By using this information, you can process the entire character. If you have any assembly language experience with disk file processing, this is actually a quite simple task. If you don't, then I might as well be explaining Einstein's theory of quantum mechanics to you in a mixture of Zulu and ancient Chinese, for all the sense I would make (but it =certainly= does not mean that you are stupid -- no way!).

POSTMASTER FONT FORMAT

POSTMASTER fonts were designed to be displayed on the hi-res screen. Indeed, the sort of math required to convert a DOTWRITER font to be displayed on the screen is what is required to display a POSTMASTER font on a printer.

The POSTMASTER font format was especially designed for easy disk access. It was also designed to be as compact as possible. In this respect, all that is required to be loaded into memory is the pointer table, which is always 190 bytes long (95 x 2). Unlike DOTWRITER, POSTMASTER does not define anything for the space character. Instead, it used the width defined for the dash "-" as its width value, and an added plus is that POSTMASTER uses the width of the period "." to define the normal space between characters in the absence of spaces.

POSTMASTER fonts are limited to 95 printable characters (values 33 through 127). The offset table is stored in groups of 2-bytes, representing the low-byte, high-byte offset from the start of the =character= data, and each pointer represent the byte offset to the actual start of each character. =VERY= handy. Because this offset is from the start of the character data, and not the file, I always add 190 (0BEH) to each offset address. This yields offset to each character from the beginning of the file (a useful tip for your own work).

Now to access a character, you subtract 32 from the ASCII value of the desired character. If the result is zero (a space), you would simply obtain the width value of a dash for its data (the width values of the period and dash should be obtained immediately after opening the font file and loading its offset table). If it is non-zero, you subtract 1 more, then double it, to get the offset of the character's position in the offset table. By having added a value of 0BEH to each offset value, pointing to the proper file position is made easy (you can also optionally add 0BEH after extracting the offset address from the table). The 2nd byte in the offset represents the sector offset within the file, and the 1st byte represents the byte offset within the sector for the start of the character.

In POSTMASTER, each character has a 3-byte header. The first byte is the byte width of each row for the character. Unlike DOTWRITER, each byte in each row represents 8 =horizontal= dot positions. The second byte represents the number of rows defined for each character. The third byte represents the actual dot width of the character.

OF DOTWRITER AND POSTMASTER

Regardless of which font format you use, it is a lot of intellectual fun to figure out how to write "X" amount of dots starting at a certain dot column position, and displaying that character, plus advancing for a specified horizontal interspace dot offset to point to the next character position. For those interested, an added treat is to first calculate if the current character will exceed the right limit of the hi-res screen, and if so, wrap around, and instead print the character on the next "line". I have found that a vertical character separation of 1/8th the dot height of the character "y" (or any of the other characters with descenders), or 2 rows, whichever is greater, produces very good results.

DISK PIECES PARTS

Due to queries generated in my last column concerning sectors, granules, and what-not, I thought a bit of explaining in regard to these terms should be in order.

A sector is a block of 256 characters (bytes). A block of 256 bytes is also called a "page". This is a handy reference on our computers because an absolute memory address (also called a 16-bit address, because the maximum absolute address on our computers is 65535, which is 1111111111111111B in binary, which takes 16 binary bit positions), is conveniently blocked off in 2-byte groupings, where the high order byte (8 bits) is the page, and the low order byte is the offset =within= the page. (By the way, a grouping of 16 bytes is called a paragraph, a grouping of 8 bytes is called a sentence, and a grouping of 2 bytes is called a word -- Hey! You would think that the hackers who developed these terms would be eloquently literary... until you try reading the atrocious annihilation of both every rule of semantics and of the fluid dynamics of idea expression, which they jokingly call documentation, that most hacker-type put out).

A granule is the smallest unit of disk space allocatable to a file. A granules consists of a number of sectors, the number of which depends upon the disk format. On a 1-sided floppy disk, there are usually 3 granules allocated to each cylinder on the disk. Because there are 18 sectors (standard format) on a cylinder, that means that each granule consists of 6 sectors. 2-sided disks usually have 6 granules allocated, 3 to a side, each still consisting of 6 sectors. Hard disk partitions (a partition is a block of space allocated to a logical disk drive) gets more interesting, because the sector per granule count depends upon how the partition was set up. A partition on a hard disk can have a minimum of 32 sectors, and a maximum of 256 sectors assigned to a cylinder. For the maximum savings in space, the partitioning software always tries to allocate 8 full granules to each cylinder (8 is the maximum granules that can be assigned to a cylinder). Dividing 32 by 8 gives up 4 sectors per granule. But allocating 256 sectors to a cylinder yields a whopping 32 sectors per granule (8182 bytes; 8K), which is a total waste, except when an extremely large data file is to be used in the partition.

A disk, or hard disk partition, can only have a maximum of 8 granules allocated to a "logical" cylinder. We say logical because some hard disk partitions usually consist of more than one disk surface (like a 2-sided disk), and even of more than one physical cylinder, where a physical cylinder is considered to be one or more disk tracks on the same "level". Thus on a 2-sided floppy disk, a physical cylinder consist of 2 tracks; one track for each side of the disk, but still at the same track position, such as track 0, or 1. In regard to floppy disks, logical and physical cylinders mean the same thing. I think if hard disk technology had been more developed when LDOS was developed, we would never have defined floppies as having logical cylinders. Ah, the price of progress.

DISK OPTIMIZATION

Seems that people are suddenly discovering things that they never knew they had on their computers: file fragmentation. As I have said before, normally this is not a big problem, except on disks, and especially on hard disk partitions where you are constantly deleting old files and creating new ones. A fragmented file is simply a file which has its data stored in blocks that are located at various points on a disk. The usual sign of a fragmented file is the report during a DIR listing that a file has more than one extent (extent counts are displayed under the "EXT" heading). It gets a little more confusing on really large files, because a large file can have more than one extent, and still be stored in consecutive sectors on the disk (contiguous). The reason for this is that as the DOS had been originally defined from the Model I days, going back to TRSDOS 2.0, a file can have a maximum of 32 granules allocated to an extent. An extent is simply a contiguously allocated block of granules, starting at one point on a disk, and continuing consecutively upward on the disk for however many granules are allocated to the extent. A granule is the smallest block of disk space which can be allocated to a file. Thus, once 32 full granules are allocated to a (large) file, then another extent is required to be used. Thus a file can often have multiple extents, but still be stored contiguously on a disk.

Last month I told out about the MODEL 4 DISK OPTIMIZATION PACKAGE I wrote. The optimizer will take fragmented files and reposition them on the disk so that they are stored contiguously. This results in faster file loads and disk accesses. The optimizer also has the ability to pack files down so that new files will be less likely to be fragmented.

Aside from its fast operation (I almost called it FASTOPT, to be in line with my other fast packages, such as FFORMAT, FBACKUP, and FASTBACK), it can also work =effortlessly= with the SubDirectory format I developed (more on SubDir's later). This is a feat which no other optimizer is capable of. Indeed, my DISKOPT program is the only one which will not fall flat on its face when working with my SubDirectory format. DISKOPT also takes advantage of any free DOS-recognized extended memory you might have available (not a requirement, but handy for fastest operation).

Two other programs are also in the package. TESTFRAG will check a disk to see if there are any fragmented (non-contiguous) files. This program is handy as a quick check to see if optimization is due. Like DISKOPT, it works smoothly with SubDirectories.

The other program on the disk is DIRCHECK. DIRCHECK will, like the others, work with SubDirectories. This program will check every part of a disk directory to ensure that it is "sound". It will detect, and optionally correct the errors it finds, except of course for those which are unrecoverable. It tests to ensure that all file entries in the directory(-ies) are properly allocated, mapped, and formatted. It will detect any potential problem that they may have by quickly cross-referencing all files, checking indexing, pointers, and hashing. Ever have a file displayed in the directory, but you can't access it? DIRCHECK will fix it. Have a file whose space is not allocated? DIRCHECK will fix it. Anything and everything that could possibly be wrong with a directory will be detected by DIRCHECK. This is not to say that directories have a habit of being in error. No. Chances are you will only come across one once in a blue moon, if ever. However, programs which are forced to trust that the directories are sound can run into trouble if they by some small chance are not, thus causing data to be scrambled. DIRCHECK ensures that this will not happen, and alerts you when it can. By using DIRCHECK every time before backing up your hard disk, or simply checking the integrity of a disk before saving an archival copy of it, you can be assured of a flawless backup or archive.

WHAT ARE SUBDIRECTORIES?

Those who have not been, or don't care to be exposed to the MS-DOS world are asking what the heck is a SubDirectory? And secondly, why have them in the first place?

Perhaps the majority of people may not have use for them, but people who must group files by subject or project, have a need for such a feature, especially on hard disks, but also to some extent on floppies.

As defined, a disk directory can only be 34 sectors in length. Why 34? Because of the way the directory was defined back in the TRSDOS 2.0 days of the Model I. The directory was designed to allow a maximum of 256 files. Considering that 256 files entries (which consist of 32 bytes apiece) can fit on 32 sector perfectly, is one reason. The other reason is that the Hash Index Table (HIT), the second sector of the directory, is only 256 bytes long, and so can only index 256 files. The other sector (thus making 34), called the Granule Allocation Table (GAT) is located at the very beginning of the directory. Thus a directory consists of first a GAT, then a HIT, and then the remainder of the directory contains the file entry tables, 8 to a sector (8 * 32 = 256 bytes).

A 1-sided double density floppy disk can only have a directory that is 18 sectors long. This consists of a GAT, a HIT, and 16 sectors which can store a maximum of 128 files (16 sectors of 8 file entries apiece). A 2-sided disk has 36 sectors to a cylinder, and so can have a full 34-sector directory (often some disk formatting programs will format the 35th and 36th sectors as directory sectors, and even allocate them to the directories, but these last 2 sectors are useless appendages).

2 files are always allocated in a directory; the BOOT/SYS file, and the DIR/SYS file. BOOT is the boot-up file that the computer accesses during a re-boot to find out where the directory is. DIR is the directory itself. On a disk with SYSTEM files present (the Disk Operating System -- DOS), 14 file slots, for SYS0/SYS through SYS13/SYS are also set aside (on system disks, even when certain SYS files are removed, the freed "slots" will not be used for storage of data files, so those slot are lost as far as new file allocation is concerned.

Although 256, or even 128 files seems like a lot, this can be actually quite small, especially on hard disk systems. Even when a hard disk partition is 5 Meg(-abytes) in size, one will find that they will run out of file slots =long= before they run out of disk space (except in special cases, such as large database files).

Another problem is that after a lot of files are put on a disk, it become difficult to keep track of them. This can also be quite a problem on a floppy system. The problem is that related files are not always grouped together, and this can only add to the confusion.

Because of this, I developed SubDirectories. SubDirectories are just like the original directory on the disk, but it allows us to added even more files to the disk space, and affords us the luxury of grouping related files into individual directories on the disk. This keeps the appearance of the main directory looking clean, and keeps support files for particular applications in an easy to find location, where they can be the only files in a particular SubDirectory.

Suppose you do a lot of word processing, maintain a lot of spreadsheets, and have a database program that maintains numerous projects. If all these files were located in one directory, you have to come up with some pretty tricky name schemes to keep them in a recognizable order during a directory listing. This has been one of the greatest cries of frustration of TRS-80 users.

Using MKDIR from the MODEL 4 SUBDIRECTORY UTILITIES package, you could create the three desired SubDirectories. One would be for word processing, perhaps called WORDPROC/DIR, another for spreadsheets, perhaps called BCX/DIR (how did I come up with that one?), and another for databases, perhaps called DATABASE/DIR. Then using the CHDIR program, you could activate each one and copy the appropriate files into each of them.

With SubDirectories, you could place all files related to each application into their own individual SubDirectory. Thus instead of having a directory listing that looks like the aftermath of worlds in collision, you would see just 3 files with /DIR extensions (other files can of course still exist in the main directory, but we are looking at a hypothetical setup that few of us would follow exactly).

The beauty in using SubDirectories is that you would use them like you would use a separate disk drive. For example suppose that the three SubDirectories we created were on drive :1. We could activate WORDPROC/DIR as drive :2 by using the command: CHDIR :2 WORDPROC. Suddenly, any time you access drive :2, you access the files stored in the WORDPROC SubDirectory. The DOS will think that it is just another disk drive. Meanwhile, if you had anything to do on the main directory of drive :1, you could still access it simply by calling up drive :1 as you did before.

If you have had any experience with other "additional directory" utilities, you may find my SubDirectory format much easier on your disk space. Most other utilities require that you reserve sizable chunks of your disk to the directories, or else lock out access to the main directory, or prevent you from using them easily, if at all, on floppy disks.

Plus, my SubDirectory structure is now the most supported format available, and even greater support is forthcoming with the advent of even more utilities which will, in addition to their normal duties, also address and support SubDirectories. If ever you have considered this route, now might be the best time to jump on board.

CONCLUSION

Well, my fingers are just about talked out. The funny part is, I never even got to the subjects that I had marked down in my notebook to cover. So rest assured (or cringe in the fact) that more is on the way.
-David Goben

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THE NEWCOMERS CORNER

by the CN80 Staff

For Novices, Beginners, First Time TRS-80 Users, and maybe the not so new user.

HARD DISK DRIVES

We get a lot of calls asking about hard disk drives. And our readers have seen a lot of discussion in CN80 about hard disk drives (many times just referred to as "hard drives"). Most of the callers and from those who write in ask the question "Just what is a hard drive and do I need one?" "Does it fit in my computer?" "What do I need to do to install one?"

A hard disk drive is an external unit that connects to the 50 conductor I/O bus connector that is on every Model 4, 4P and 4D. The Radio Shack version of the hard disk drive unit measures five inches high, fourteen inches wide, and fifteen inches long. It is built like a Sherman tank, weighs as much as your Model 4 or 4P, and has a fan for cooling, its own power supply with cord that plugs directly into your 110 volt wall socket. And uses a key lock for the on and off switch.

Rebuilt Radio Shack hard disk drives are currently available from Roy T. Beck (see his classified ad) and used ones from Pacific Computer Exchange. Misosys has their own version, which we have never seen or have any information about, so we can't tell you much about them, except they are the most expensive, around $600, whereas a good rebuilt one is about $200 to $300 from Roy T. Beck.

Because they sit outside your computer and have their own power supply they add no additional strain on your computers power supply and are fed only by the information signals that are sent out by your computer. But they need to be placed in an area where they are not bumped, jarred, jiggled, or subject to any other form of vibration. The standard length of the cable connecting them to your computer is four feet. This gives you ample cable to set the hard drive well out of your working area.

Why are they so delicate compared to your plastic floppy disks? Because the "hard disk" part of the drive is a rigid storage medium that uses a rigid aluminum circular disk coated with iron oxide. The reading and writing arm of the hard drive rides on a microscopic bubble of air above the surface of the aluminum disk. This is what makes them so fragile, and if really bumped during its reading or writing to the disk it can cause the drive to crash. When a hard drive "crashes" it is a real disaster because you cannot remove the hard disk as you can a floppy and shove in your backup copy. In the case of a floppy disk when you get a bad sector or a glitch in a file, you might only loose the information in that file and can recover all the information from the rest of the disk. With a hard drive if it "crashes" you will loose everything that is on it.

5 megabyte drives were the common size originally, now 20 and 40 megabytes seem to be the more common size, with hard drives for the MS-PCs available from 70 and up to several 100 million megabytes.

The hard drive hype you read about today in the MS-PC magazines is about drives built for those computers. The drives are much more compact and fit inside the computer case. Do not confuse that sales information with the hard drives for the TRS-80s.

WHAT IS INSIDE THE DRIVE?

As we said before the external hard drive enclosure contains the hard disk drive unit, commonly referred to as the "bubble," the power supply, a fan for cooling, a drive controller board, and an interface board. Both of these have as many chips and printed circuits as the mother board in your computer.

WHAT DOES IT TAKE TO USE ONE?

To use one you plug it into the power outlet, connect the 50 conductor ribbon to your computer and you are ready to go - almost!

Because the signals sent to the hard disk drive are sent through a different disk controller circuit or control board than the ones used to talk to your floppy disk drives you need a to create a special "boot" disk.

This special boot disk is created as you first format your hard drive. Because the hard drive has so much more capacity for storage than your floppy disks they are generally "partitioned" into several drive numbers. We won't go into a discussion of how and why this is done, because much of this information has been published in CN80 already, and if you do not have a hard drive the details would be of no interest to you now. It is enough for you to understand that a Hard Disk Drive is a different animal than the floppy disk drives in your computer or in your external floppy disk drives. But if you are thinking that you need one here are a few hard disk management tips that you are going to need to know.

HARD DRIVE MANAGEMENT TIPS

[1] Learn how to back up your hard disk and do it daily or every time you put in a 4 or 5 hours of working with data on a hard disk back it up several times during the day.

Every hard disk in use today WILL break down within just a few years. It's not a question of will it, the question is when.

Of course there are several utility programs available that makes this chore faster and easier. David Goben's FASTBACK utility is the fastest and easy to use.

[2] Divide the disk into subdirectories and put related files into each subdirectory. Dividing your hard disk drive into directories and subdirectories has not been possible or the general practice for the TRS-80 user. Again you will be reading more about this in David Goben's column and using his subdirectory program.

By adding subdirectories to your hard drive it makes your files easier to locate you go beyond the common practice of opening two or four drive partitions, and dumping files to them willy-nilly, then trying to remember what file is where.

[3] As you work with your data files on a hard drive the data will become scattered across the drive in many different locations, this is know as "fragmentation" and you will need to defragment your drive frequently by either backing up each file to floppies, then sending them back to the hard drive. Again Goben's FBACKUP does this faster than any other backup program. His disk drive optimizer program DISKOPT does this even faster. You should run a

defragmentation program every few months.

DO I NEED A HARD DRIVE

This is where we are going to get into trouble with every hard drive afectionado who reads this. But we are not hard drive bashers, we have hard drives on all our work stations and we use them. But we use them as they were intended to be used.

Originally because we were limited to single-sided disks that held 180K or less, we needed hard drives to hold those large data files or to do massive programming chores. But today with the ability to store up to 720K on a floppy disk they are becoming more and more important to the average user than a having hard disk drive.

Then there was the early sales hype which still exists today, not so much from those who sell hard drives, but from your friend who owns one who is convinced that the hard drive is the only thing anyone should use. This pitch comes across as "Get a hard drive, dump all your floppy disk files to it and you will never have to mess with a floppy disk again." Wrong.

The proper use of a hard drive is when you have files that are too large for individual floppies to contain (today those files that exceed 720K), then you need to store them on a hard drive. Also when you have data files that are very large you can update that data faster, because hard disk drives are faster than floppy disk drives.

So what is the proper intent for the use of hard drives? (In our opinion of course, and this has removed a lot of the problems and frustrations that we experienced when we too, fell for the hype of "the hard drive is the cure for all ills". There is nothing like having a deadline, and having your data file crash just a few hours before your deadline and having to spend the next four to six hours working at night or over the weekend to restore all the information that was lost.) If you use your hard drive as a casual computerist then it is not as important when the drive goes out and you do not have to have the information immediately. But even at that, how about the hours you will waste setting it all up again. Recently there have been several reports from bulletin board operators whose hard drive crashed and now their board is no longer available.

How do we recommend you using a hard drive for really important work? What we do with our files several of which are mailing lists that have 600 or 700K of data in each file, is to download them from our backup disks to the hard disk drive when we need to update the files. This allows us to do the update much faster than writing to a floppy disk. Then after the data is updated we use FBACKUP to back them up to our storage disks again. This procedure means that we never depend on the hard drive as our storage media. It also assures us that we have backed up the data as soon as the updating is done. Some of these files take a day to update, and we will back them up several times during the day to assure that we won't lose more than a few hours of work, rather than lose a few days worth.

This also means that we might not turn our hard drives on for days at a time. Thus prolonging the life of the drive.

DO YOU REALLY NEED A HARD DRIVE

That is a question that you can determine only by your individual application and the way you use your computer can determine.

Considering that for the average computer user three floppy disk drives are the most convenient minimum system to use, a hard drive is not needed or even desirable.
-CN80

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RECOPY3 & RECOPY4

New companion programs to the PGMRECs for TRSDOS 1.3 and LS-DOS6.3

by Henry H. Herrdegen

Having made a list of all programs on my master disks, the 18 (so far) CN80 disks, and others with the FILEDIRs, and added remarks identifying each of the over 1000 files with the PGMRECs, I was faced with the task of splitting these lists into significant categories, such as model III or 4, Utility programs, Patches, Household programs, Games, etc. Hating typing, I did not look forward to re-type all these entries into individual lists.

There ought to be a better way, I thought, and came up with RECOPY. The individual entries being in strings, and handled by the two main programs in one dimensional arrays, RECOPY first loads both lists, source and receiving, into two arrays. Note that it can not create a list, the receiving list has to be existing. (Make a new PGMREC list with a dummy name and disk code entry, delete it later). A prompt tells how big they are, and asks which record you want to copy. It looks thru the source array strings, only for the length of the entered search string, which means that you only have to input the first few significant letters of that name. (The same is true for the PGMRECs). If a match is found, it displays the whole string on screen, and asks if this is the right record.

If it is not, arrow keys let you scroll up or down the list. If it is, <C>opy pulls it into the receiving array, incrementing the counter. A prompt then asks if you want to <Q>uit (saving the transferred files), transfer the <N>ext record (on the source list), or transfer <A>nother one. If the next record is not what you wanted, you can scroll again with the arrows.

When you <Q>uit from either prompt, in the III program, good old CMD"O" does the sorting, and in the 4 version, the BSORT/CMD. If you do not have it in the system, again an auxiliary "SWAP" sort will be called by an error trap.

You then can either handle <O>ther lists, <E>nd the program and remain in BASIC, or e<X>it to DOS. During the program run, the screen does not scroll, the short instruction, the updated status prompts, the selected record string and the appropriate "menu" choice texts appear at the proper places on the screen. The source list is not altered in any way by this program, and you may want to delete a transferred record later on with PGMREC.

The program is short, 46 lines for the III (2 more for the 4), including error traps to catch wrong List names, to let them be re-entered without crashing the program with a "File not found" error. It also checks internally for non existing Record names, and prompts about it. If either the 500 file space is full or it runs out of string space, the up to then for copy selected files will be sorted and saved without a crash also. Disk files are only open during disk access, but <BREAK> is NOT disabled, so DON'T push it while the drives are spinning. During name inputs, wrong keys, like arrow, clear, etc., are not blocked, so be careful. The BSORT/CMD used here as in the other two 4 programs, is on the TRSDOS 6.2 Utilities disk (26-0315). It can be replaced by changing the command syntax (L 60) with David Goben's SORT4/CMD from CNDISK #5 (Vol 2,#4) but you will have to protect memory and initiate it before running the RECOPY program.

So it became the third of a program trilogy, FILEDIR, PGMREC, and now RECOPY.

If you are handling large lists, these programs may not respond immediately to a key input, the blinking cursor may show up some other place, or the running counter may stop. Do not start pushing keys, our trusty 80 is collecting garbage. That can be from as little as 10 seconds to more then a minute. Be patient, we do have memory restrictions. If you split a large list, as I just did with a list of all files on the 18 CNDISKs (382 files, with added remarks, almost all full length), delete the transferred files occasionally from the source list, so as not to run out of string space. And start to copy files from the end of the list, deleting files at the end of a list with the PGMREC is faster. I did get the occasional "out of memory" trying to RUN PGMREC, after working with large files. Infamous Garbage again, so re-boot. I have set the CLEAR xxxxx in the III programs fairly high to allow room for a lot of strings, you could possibly squeeze a few more K in, or reduce it to suit your system.

That "Master" list involved the ARRANGER II, which let me unify the various early disk names to "CNDISKxx", and gave me an overall alphabetized list easily updated. Then FILEDIR to make a list suitable for the adding of remarks with PGMREC, and finally dividing it into model III and 4 programs with the RECOPY. Now, the updating for disk 19 and the following ones should be a breeze.

It is too bad that one does not realize early on how important such lists will become, has not the tools to make them in the first place, and then is faced with several thousand files, scattered over a few hundred disks. It's a lousy task to type all these remarks, but by checking those files, you may discover good programs you never knew you had. It happened to me.

Enjoy the "80" !
-Henry H. Herrdegen.

(Note) Henry Herrdegen's Trilogy of programs are on CN80 Disk Series #19, and is now available for shipping.

The Hardware Corner

ANDY'S HARDWARE HACKER PROJECT NUMBER TWO

by Andrew Miller

The following project came about with the nerve-racking "slight" but noticeable wavy lines that appear in the Video output on the screen of the Model 4, Gate-Array version. It's not hardly noticeable for those of you that are using the Non-Gate array machines, but in the Gate-Array version the frequency of the board is split-up differently, and consequently arrives at a particular level that has a tendency to want to "sneak" into the Video lines. This is called RFI, or Radio Frequency Interference. For those not familiar with this Phenomenon, just turn on your stereo, or radio while the computer is running, you will hear all kinds of strange, deedle, deedle sounds. It's more noticeable if the Disk Drives are being used. Formatting a disk draws a bit more current from the internal power supply (s), and increases the problem as a RF signal will increase with a heavier duty cycle.

Enough Technical jargon. I found a way to reduce this Stray RF energy by about 80%, which improves the "wavy lines on the Video Screen.

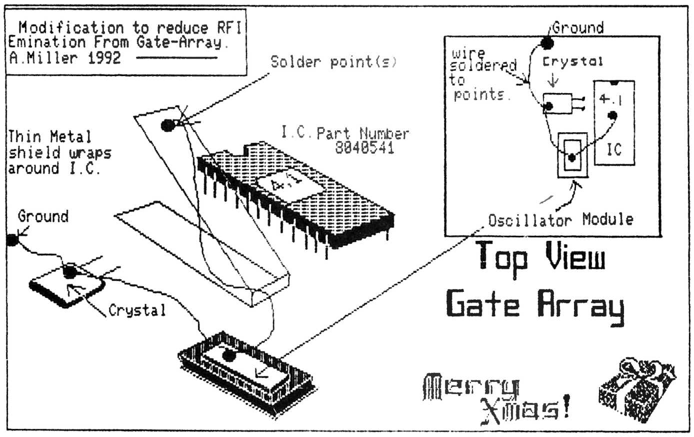
The accompanying diagram is almost self-explanatory, but I will outline a few pointers here that will give you a better idea on this project. You will of course, have to lift the cabinet off the computer. The I.C. that's generating this unwanted signal in the air is 4.1 PAL chip. I'm not sure of the board location, as it is "tight" to print it on the board, possibly the manufacture didn't print it on the board, but it's an easy one to spot. Next to it, is an Oscillator (tiny box), and a crystal.

You will need a piece of any very thin metal, I used super-thin brass from a Hobby Shop, it solders excellent too! Cut a strip to wrap the I.C. all the way around length wise. Don't short out the pins when your doing this. Then after the chip is wrapped, solder the ends together. You can get this down tightly with a pair of needle-nose pliers. This will also keep the metal from sliding around on the I.C. Then install it back in the socket, check positioning and any pin bending at all times.

Finally, run a small wire soldered to the metal Chip Shield to the oscillator block, then to the crystal, and last to the board ground.

Hope this works out for all that try it, it certainly has helped my shaky video. The hi-res stuff will look cleaner.

Best wishes to all for an enjoyable Christmas this year, make it a good one anyway! This is my present to all fellow TRS-80 users...more projects to come in the new year.
-Andy Miller



Cleaning tip: A two inch inexpensive paint brush is great for dusting your keyboard. Keep it handy and use it often. Use Windex to clean your keys, screen and case. -CN80

COMPARE DIFFERENCES FOR MODEL III AND 4 BASIC PROGRAMS a CodeWorks PD program to compare ASCII saved programs, for TRSDOS 1.3 and LS-DOS 6.3 revamped as DIFF/BAS. (See program listing number one and two.)
by Henry H. Herrdegen.

Yes, Virginia, there is a better mouse trap. Back in 89 I wrote a little program for the Model III, to compare two BASIC programs for changes I might have insufficient documented (it happens, doesn't it?), rather than reading the two printouts. It is not very smart, gets screwed up if the line count is different, but prints the lines from both programs if they differ. (CN80, volume 2.3 and on Disk 4.)

The better mouse trap is a public domain program, I recently discovered, and adapted for 6.3 BASIC, with a few frills, like paginating, added. And after that easy conversion, in the back of my mind I could hear Stan's (justified) complaint that nobody is writing for the 1.3 anymore, so I did that too.

COMPDIF3/BAS and COMPDIF4/BAS compares two ASCII saved BASIC programs, regardless of length differences, and lists the Changed and/or Added lines in the revised file, and the Deleted lines in the original one. At the end, a summary with the line count for both, and the number of lines added, changed or deleted is printed. Screen and printout are paginated. And if you had first looked at the changes on the screen, you can then get a hard copy without re-running the program.

And it is done fairly quick. On the 4, I checked a 718 line program, and it printed the 18 added and 23 changed lines (none deleted) in less than 3 minutes, my DMP 200 in the 40% slower Correspondence Quality setting. Imagine to read thru the two 12 page printouts, trying to spot the differences! It is a great programming help.

The programs opening screen reminds you about the ASCII requirement, asking for the original and the revised file, and if you want hard copy or not. After that, its telling you that it is processing, opening the two files, reading them into two arrays and closes them. Then it opens them again into different buffers, compares line for line, and prints them if different, with the summary at the end.

Make sure the two BASIC programs you want to check are saved in ASCII anywhere in the system and none has been renumbered. you can check two files with the same name on different disks. If not ASCII, you likely will get a 'String too long in 55' error, or all lines will show up as Added---> or Deleted->, and, if renumbered, total confusion will reign.

The pagination will prevent screen scrolling until you have examined the screen, (maximum 22 lines on the 4, 15 on the III), then press the (prompted) SpaceBar for the next screen. You may see only 15 (7) screen lines, so the screen would not scroll if the last line printed had more then 230 characters. The line length is restricted to 245 characters, in order to make room in the string for the 10 characters of the change identification. The last of the program line display may also be shorter, so that it will not scroll away with the 6 message lines printed. The printout pagination works similar, but printing an underlined title with the two program names, the date and page number, and maximum 57 lines, also going to a new page if the message lines would overrun the page. The top margin is to be 5 lines or less, in order to achieve proper page feed. The line count is internal, no Top of Form command is used. If you never have such long program lines, you may change the "X>15" ("X>7") in line 88.

It seemed a bit annoying to look up the 'original' program printout in order to find out what had been changed (no " Was---> abc..xyz" line in the DIFF/BAS program, and only the deleted line number without the code), so I added the display and printout of these lines. It makes the printout a bit longer, but lets you compare without shuffling paper. If at first you had only looked at the screens, a couple of lines (71 & 72) let you get a printout without re-running the program and specifying and scanning the two files.

I also re-arranged the code some, made multi statement lines, introduced two new Inkey functions, making the Inkey a subroutine, indifferent to low or caps (L 12 & 13), added date printout, the pagination, and re-numbered it. The original scan and check algorithm is still there, (almost) unchanged.

There are two situations to watch: It will get confused if you put a space between code blocks by ending the last line of the block with a <Down ARROW><ENTER> (as I am want to do sometimes), not reading this as the end of the line. Put a period, or other symbol after the Down Arrow, and it will read correct, but still can cause a slight problem: if such line has been changed, the line count for the hard copy is false, altering the top and bottom margins, and may cause a page overrun in a multi page printout. This is a neat trick to separate blocks of code without adding empty REM lines, but could get you also into trouble with some analytic programs.

The second, also one of my (bad?) habits, adding a number '0' REM line for program identification, will screw it up if this Line 0 is only in one program. It will call all lines Added---> or Deleted->, plus an "Input past End in 55" error, and will not read the line 0. Some DOS, like NEWDOS, can't handle a line 0 at all, but it will work correct if both programs sport one, even if only a "0 '".

Originally the two DIM's were 600, but I have set them to 800 in order to run the 700+ line program, but there is not much memory left. If you have a problem with that, and don't expect to compare long programs, reduce the two numbers (in L 10), but keep them identical.

Differences between the 3 and 4 programs are mainly in TABs and line counts forced by the screen sizes, and the slight variation in the languages. The "LINE"INPUT for instance was needed to permit a drive designation, which the plain INPUT does not permit in the 1.3 BASIC. Still, only 16 lines are different.

There are enough ** remarks ** in the program to make it understandable, so I will refrain from a detailed analysis. If you have any questions or problems, please contact me thru CN80. I will be happy to try to help you.

Keep the 80 humming!
-Henry H. Herrdegen.

TWO BASIC PROGRAMS FOR MODEL 4

by Parker Snapp

Two short Basic programs that may be of interest to CN-80 readers are enclosed. I'd like to see more "type in" programs in CN-80. I have used Basic's "RENUM" to make my programs easier to copy. The printer codes are Tandy codes, which I like much better than IBM codes. This letter, and the introductions for the programs, are written with Howe Software TYPITALL. I wish continued success to CN-80, and hope that it will always include material for "plain vanilla" TRS-80 readers, using Tandy printers, whether the readers are Model I, Model III, or Model 4, 4P, 4D users.

BICYCLE GEARING CALCULATIONS

(Program Listing Number Three)

The "gear" of a bicycle is found by calculating the relation of a modern multi-geared bicycle to the original high-wheel "ordinary". What our fathers called the "GOO" (grand old ordinary) had a single large driving wheel, and it needed a long-legged rider to straddle a six-foot wheel to get the best performance. When the GOO evolved into the "safety" with two same-sized wheels, the advantage of a large driving wheel could be obtained with a large chain wheel driving a small cog on the rear wheel. But the definition for "gear" remains the same: find out how one revolution of the pedals will drive how big a single drive wheel. A six foot GOO has a 72 inch diameter wheel. "72" is now considered a moderate gear, good enough for all-purpose use if there is a single cog on the back wheel of the "safety". With a modern 27 inch wheel, a 48 tooth chain wheel and 18 tooth rear cog, the calculated "gear" is 27 x 48/18 = 72. Henry Sturmey, an Englishman, (with Archer), devised a popular three-speed hub giving ratios of 3/4 down and 4/3 up, providing gears of 54, 72, and 96: a gear for climbing, one for riding on the level, and one for downhill work. The invention of the derailleur, fitted both to the chain wheel and the rear cog cluster, gives us a seemingly unlimited range of gears. The Mountain Bike may have 21 "speeds" (3 front/7 rear), or even 24 "speeds" (3 front/8 rear). But how does "speed" relate to "gear"? Popular derailleurs are made by Shimano, Suntour, Campagnolo, and others. I have put a "standard" chain wheel selection, and 5 cog cluster sets, chosen out of a bicycle catalog, in the program SHIMANO/BAS to print a display of the range of "gears" for each set. Do you wonder what the "gears" are for your new 21-speed Mountain Bike? The chain wheels may be stamped with the tooth count for each wheel. With the bike on a stand, rotate the rear cluster slowly while counting the teeth on each cog. Plug the values into the program. Note that Mountain Bike "gearing" doesn't go much higher than the Sturmey-Archer, but considerably lower, as you might expect. Some Mountain Bikes have 26 inch or even 24 inch wheels, so this should be plugged into the program also.

THREE RULERS FOR YOUR PRINTER
(Program Listing Number Four)
One of the irritations of a wide carriage printer is its determination to print off the page onto the platen, whenever not watched closely. A ruler made to the pitch of the font in use is handy to check the right margin, or to "spot" the placement of text on a page. Why not let the printer print its own ruler? Users of 80-column printers can find use for such a ruler also. I wrote the program RULE/BAS to print paper rulers for PICA (10 C P I), ELITE (12 C P I) and CONDENSED (16.7 C P I). It wouldn't be hard to modify the counts for in-between pitches. Printers usually have a paper bale marked off in PICA, but a separate moveable ruler can come in handy. Note that I mentioned "Tandy": a printer using EPSON/IBM codes will need some modification of the font-selection codes. I print the rulers on ordinary copy paper, and use "gluestick" to mount them on 1-1/2 inch wide slips of pressboard (thin stiff cardboard), with the flap turned under and glued to the back.
-Parker Snapp

Open Forum

LTR: I could not help but sit down [write this letter] when I read your comments regarding Megamemory by Anitek.

I have a number of boards installed in machines for people using my programs and it enables them to have unlimited capacity.

In one installation, we have 6 megabytes, and 3 years of dog tag data are at the humane society officers instant recall. Almost all programs I write, use the megamemory and allow tremendouse flexability.

When I first received the unit I was disappointed that only 16K could be activated at any one time. I have found this to be a blessing in disguise. I now use 8000H to 0C000H for data storage. I use 0C000H to 0000H for storing data that is applicable to all other data in the megamemory. I can't say how much I like the system.

Believe it or not, but I have discarded my hard disk and use a virtual hard disk in megamemory. It allows me to assemble programs in less than half the time through a hard disk. All my program modules are obtained instantly and permit much faster and variable programing. Because my main use of a computer is in writing programs, this system is much superior for me.
-E. F. Cape Coral, FL

A: That's great that you get so much use out of your megamemory systems. But the average TRS-80 user is not a programmer. And would not require such huge memories. What happens when the power goes off? We assume that you have loaded your programs into a volatile memory and would lose them in a power failure, or even accidentally turning off the power switch.

Perhaps we need more information on the use of the megamemory, but we stand on our advice that the average user running the average application programs available today, does not need it.

We look forward to hearing from others on the subject.
-CN80

COMPDIF3 BASIC PROGRAM FOR THE MODEL III **Program Listing Number One** by Henry H. Herrdegen

```
0 'COMPDIF3/BAS: revamped DIFF/BAS for the Model III: corrected syntax, added:     printing both
lines, paginating, Inkeys and alternate finish, condensed and      renumbered, by Henry H. Herrdegen
(92 01 16). 92 07 04
1 ' *** DIFF/BAS * FOR CODEWORKS - 3838 SOUTH WARNER ST.          ** (Credits.) **
2 ' *** TACOMA WA 98409 VOICE 206-475-2219 MODEM 206-475-2356
3 ' *** (c) 1987 80-NW Pub Inc placed in public domain 1987
10 CLEAR 5000: CLS: DEFSTR F,K,U: DIM A(800), B(800)'             ** Initiate. **
11 DT$=MID$(TIME$,7,3)+LEFT$(TIME$,2)+" "+MID$(TIME$,4,2): U="#####": GOTO 20
12 K=INKEY$: IF K="" THEN 12'                              ** Inkey Subroutine **
13 IF ASC(K)<123 AND ASC(K)>96 THEN K=CHR$(ASC(K)-32): RETURN ELSE RETURN
20 PRINT STRING$(24,45)" The CodeWorks "STRING$(24,45)'      ** Input screen. **
21 PRINT TAB(12) "F I L E    C O M P A R E    P R O G R A M"
22 PRINT "    Compares ASCII program files and prints the differences"
23 PRINT "  (adapted for TRSDOS 1.3 and enhanced by Henry H. Herrdegen)"
24 PRINT STRING$(63,45): PRINT
25 LINEINPUT "   Name of original file "; F: LINEINPUT "   Name of revised file  "; F1
26 PRINT "   Do you want printer output too ? (Y/N): ";
27 GOSUB 12: IF K="N" THEN PRINT K;: GOTO 29
28 IF K="Y" THEN PRINT K: P=1: PG=1: GOSUB 98 ELSE 27
29 PRINT: PRINT: PRINT "      Processing . . . ";
30 OPEN"I",1,F'                    ** Read original file and make A( ) array. **
31  FOR I=1 TO 800: IF EOF(1) THEN CLOSE: N1=I-1: V=0: S=0: GOTO 40
32  LINE INPUT#1,A$: S=INSTR(A$," "): V=VAL(LEFT$(A$,S)): A(I)=V: NEXT
40 OPEN"I",1,F1'                   ** Read revised file and make B( ) array. **
41  FOR I=1 TO 800: IF EOF(1) THEN CLOSE: N2=I-1: GOTO 50
42  LINE INPUT#1,A$: S=INSTR(A$," "): V=VAL(LEFT$(A$,S)): B(I)=V: NEXT
50 IF N1=>N2 THEN N=N1 ELSE N=N2'                        ** read files and compare. **
51 OPEN"I",1,F: OPEN"I",2,F1: A=0: C=0: D=0: I=0: J=0: CLS
52 I=I+1:J=J+1
53 IF I=N+1 OR J=N+1 THEN CLOSE: GOTO 59
54 IF A(I)=0 AND B(J)<>0 THEN LINE INPUT#2,B$: PRINT "Added---> "+B$: A=A+1: J=J+1: GOSUB
80: GOTO 53
55 IF A(I)=B(J) THEN LINE INPUT#1, A$: LINE INPUT #2, B$: ELSE 57
56 IF A$=B$ THEN 52 ELSE PRINT "Changed-> "+B$: PRINT " Was----> "+A$: C=C+1: GOSUB 81:
GOTO 52
57 IF A(I)<B(J) OR (A(I)>0 AND B(J)=0) THEN LINE INPUT#1,A$: PRINT "Deleted-> "+A$: GOSUB 82:
I=I+1: D=D+1: GOTO 53
58 IF A(I)>B(J) OR (A(I)=0 AND B(J)>0) THEN LINE INPUT#2,B$: PRINT "Added---> "+B$: J=J+1:
A=A+1: GOSUB 80: GOTO 53
59 IF P AND X>48 THEN Y=13-(X-48): GOSUB 90 ELSE IF P=0 AND X=>5 GOSUB 91
60 PRINT: PRINT "There are "N1" lines in the original program ("F")"
61 PRINT "There are "N2" lines in the revised program  ("F1")": PRINT
62 PRINT USING U; A;: PRINT " Lines were ADDED to the revised program."
63 PRINT USING U; C;: PRINT " Lines were CHANGED in the revised program."
64 PRINT USING U; D;: PRINT " Lines in the original were DELETED in the revised program.": IF P
GOSUB 93
70 PRINT: PRINT " Done.": IF P THEN LPRINT: LPRINT "  End": END'   ** Finish **
71 PRINT " Do you now want a hardcopy ? (Y/N): ";
72 GOSUB 12: IF K="Y" THEN P=1: PG=1: GOSUB 98: GOTO 51 ELSE IF K="N" THEN CLS: END
ELSE 72
80 A$="": IF P THEN LPRINT "Added---> "+B$: GOTO 86 ELSE 86'  ** Print Sub's **
81 IF P THEN LPRINT "Changed-> "+B$: LPRINT " Was----> "+A$: GOTO 83 ELSE 83
82 B$="": IF P THEN LPRINT "Deleted-> "+A$
```

Cont'd on next page.

```
83 L=LEN(A$): IF P THEN IF L>230 THEN X=X+3 ELSE IF L>150 THEN X=X+2 ELSE IF L>70 THEN X=X+1 ELSE 85
84 IF P THEN 85 ELSE IF L>179 THEN X=X+3 ELSE IF L>116 THEN X=X+2 ELSE IF L>53 THEN X=X+1
85 IF B$="" THEN 88 ELSE X=X+1
86 L=LEN(B$): IF P THEN IF L>230 THEN X=X+3 ELSE IF L>150 THEN X=X+2 ELSE IF L>70 THEN X=X+1 ELSE 88
87 IF P THEN 88 ELSE IF L>179 THEN X=X+3 ELSE IF L>116 THEN X=X+2 ELSE IF L>53 THEN X=X+1
88 X=X+1: IF P AND X=>50 THEN Y=11-(X-50): GOSUB 90 ELSE IF P=0 AND X>7 THEN 91
89 RETURN
90 LPRINT TAB(60) "continued:": LPRINT STRING$(Y,10): PG=PG+1: GOSUB 98: RETURN
91 PRINT TAB(25) "press <SPACE BAR> to continue . . . ";
92 GOSUB 12: IF K<>" " THEN 92 ELSE CLS: X=0: RETURN
93 LPRINT: LPRINT "There are "N1" lines in the original program ("F")"
94 LPRINT "There are "N2" lines in the revised program  ("F1")": LPRINT
95 LPRINT USING U; A;: LPRINT " Lines were ADDED to the revised program."
96 LPRINT USING U; C;: LPRINT " Lines were CHANGED in the revised program."
97 LPRINT USING U; D;: LPRINT " Lines in the original were DELETED in the revised program.": RETURN
98 LPRINT "Changes in " F1 " compared to " F "." TAB(55) DT$ ", " MID$(TIME$,10,5) ";  pg.:" PG
99 LPRINT STRING$(79,45): X=0: Y=0: LPRINT: RETURN
```

COMPDIF4 BASIC PROGRAM FOR THE MODEL 4 Program Listing Number Two by Henry H. Herrdegen

```
0 'COMPDIF4/BAS: revamped DIFF/BAS for the Model 4: corrected syntax, added:        printing both lines, paginating, Inkeys and alternate finish, condensed and        renumbered by Henry H. Herrdegen (92 01 16). 92 07 04
1 ' *** DIFF/BAS * FOR CODEWORKS - 3838 SOUTH WARNER ST.        ** (Credits.) **
2 ' *** TACOMA WA 98409 VOICE 206-475-2219 MODEM 206-475-2356
3 ' *** (c) 1987 80-NW Pub Inc placed in public domain 1987
10 CLEAR: CLS: DEFSTR F,K,U: DIM A(800), B(800): U="#####"'       ** Initiate. **
11 DT$=RIGHT$(DATE$,2)+" "+LEFT$(DATE$,2)+" "+MID$(DATE$,4,2): GOTO 20
12 K=INKEY$: IF K="" THEN 12'                           ** Inkey Subroutine **
13 IF ASC(K)<123 AND ASC(K)>96 THEN K=CHR$(ASC(K)-32): RETURN ELSE RETURN
20 PRINT STRING$(31,45)" The CodeWorks "STRING$(32,45)'      ** Input screen. **
21 PRINT TAB(20) "F I L E   C O M P A R E   P R O G R A M"
22 PRINT TAB(12) "Compares ASCII program files and prints the differences"
23 PRINT TAB(9) "(adapted for LS-DOS 6.3.x and enhanced by Henry H. Herrdegen)"
24 PRINT STRING$(78,45): PRINT
25 INPUT "   Name of original file "; F: INPUT "   Name of revised file  "; F1
26 PRINT "   Do you want printer output too ? (Y/N): ";
27 GOSUB 12: IF K="N" THEN PRINT K;: GOTO 29
28 IF K="Y" THEN PRINT K: P=1: PG=1: GOSUB 98 ELSE 27
29 PRINT: PRINT: PRINT "      Processing . . . ";
30 OPEN"I",1,F'                          ** Read original file and make A( ) array. **
31  FOR I=1 TO 800: IF EOF(1) THEN CLOSE: N1=I-1: V=0: S=0: GOTO 40
32  LINE INPUT#1,A$: S=INSTR(A$," "): V=VAL(LEFT$(A$,S)): A(I)=V: NEXT
40 OPEN"I",1,F1'                          ** Read revised file and make B( ) array. **
41  FOR I=1 TO 800: IF EOF(1) THEN CLOSE: N2=I-1: GOTO 50
42  LINE INPUT#1,A$: S=INSTR(A$," "): V=VAL(LEFT$(A$,S)): B(I)=V: NEXT
```

Cont'd on next page.

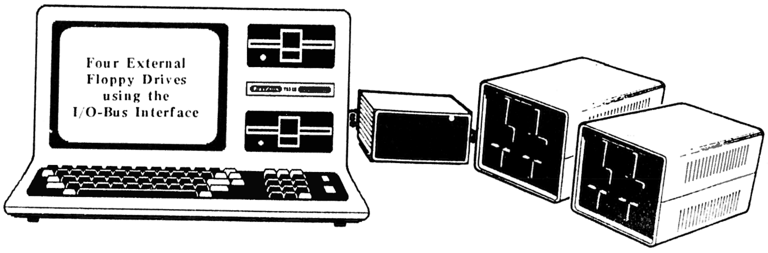
```
50 IF N1=>N2 THEN N=N1 ELSE N=N2'                    ** read files and compare. **
51 OPEN"I",1,F: OPEN"I",2,F1: A=0: C=0: D=0: I=0: J=0: CLS
52 I=I+1:J=J+1
53 IF I=N+1 OR J=N+1 THEN CLOSE: GOTO 59
54 IF A(I)=0 AND B(J)<>0 THEN LINE INPUT#2,B$: PRINT "Added---> "+B$: A=A+1: J=J+1: GOSUB
80: GOTO 53
55 IF A(I)=B(J) THEN LINE INPUT#1, A$: LINE INPUT #2, B$: ELSE 57
56 IF A$=B$ THEN 52 ELSE PRINT "Changed-> "+B$: PRINT " Was----> "+A$: C=C+1: GOSUB 81:
GOTO 52
57 IF A(I)<B(J) OR (A(I)>0 AND B(J)=0) THEN LINE INPUT#1,A$: PRINT "Deleted-> "+A$: GOSUB 82:
I=I+1: D=D+1: GOTO 53
58 IF A(I)>B(J) OR (A(I)=0 AND B(J)>0) THEN LINE INPUT#2,B$: PRINT "Added---> "+B$: J=J+1:
A=A+1: GOSUB 80: GOTO 53
59 IF P AND X>48 THEN Y=13-(X-48): GOSUB 90 ELSE IF P=0 AND X=>13 THEN GOSUB 91
60 PRINT: PRINT "There are "N1" lines in the original program ("F")"
61 PRINT "There are "N2" lines in the revised program  ("F1")": PRINT
62 PRINT USING U; A;: PRINT " Lines were ADDED to the revised program."
63 PRINT USING U; C;: PRINT " Lines were CHANGED in the revised program."
64 PRINT USING U; D;: PRINT " Lines in the original were DELETED in the revised program.": IF P
THEN GOSUB 93
70 PRINT: PRINT " Done.": IF P THEN LPRINT: LPRINT "  End": END'   ** Finish **
71 PRINT " Do you now want a hardcopy ? (Y/N): ";
72 GOSUB 12: IF K="Y" THEN P=1: PG=1: GOSUB 98: GOTO 51 ELSE IF K="N" THEN CLS: END
ELSE 72
80 A$="": IF P THEN LPRINT "Added---> "+B$: GOTO 86 ELSE 86'  ** Print Sub's **
81 IF P THEN LPRINT "Changed-> "+B$: LPRINT " Was----> "+A$: GOTO 83 ELSE 83
82 B$="": IF P THEN LPRINT "Deleted-> "+A$
83 L=LEN(A$): IF P THEN IF L>230 THEN X=X+3 ELSE IF L>150 THEN X=X+2 ELSE IF L>70 THEN
X=X+1 ELSE 85
84 IF P THEN 85 ELSE IF L>229 THEN X=X+3 ELSE IF L>149 THEN X=X+2 ELSE IF L>69 THEN
X=X+1
85 IF B$="" THEN 88 ELSE X=X+1
86 L=LEN(B$): IF P THEN IF L>230 THEN X=X+3 ELSE IF L>150 THEN X=X+2 ELSE IF L>70 THEN
X=X+1 ELSE 88
87 IF P THEN 88 ELSE IF L>229 THEN X=X+3 ELSE IF L>149 THEN X=X+2 ELSE IF L>69 THEN
X=X+1
88 X=X+1: IF P AND X=>50 THEN Y=11-(X-50): GOSUB 90 ELSE IF P=0 AND X>15 THEN 91
89 RETURN
90 LPRINT TAB(60) "continued:": LPRINT STRING$(Y,10): PG=PG+1: GOSUB 98: RETURN
91 PRINT TAB(40) "press <SPACE BAR> to continue . . . ";
92 GOSUB 12: IF K<>" " THEN 92 ELSE CLS: X=0: RETURN
93 LPRINT: LPRINT "There are "N1" lines in the original program ("F")"
94 LPRINT "There are "N2" lines in the revised program  ("F1")": LPRINT
95 LPRINT USING U; A;: LPRINT " Lines were ADDED to the revised program."
96 LPRINT USING U; C;: LPRINT " Lines were CHANGED in the revised program."
97 LPRINT USING U; D;: LPRINT " Lines in the original were DELETED in the revised program.":
RETURN
98 LPRINT "Changes in "F1" compared to "F"." TAB(55) DT$ ", " LEFT$(TIME$,5) ";  PG.:" PG
99 LPRINT STRING$(79,45): X=0: Y=0: LPRINT: RETURN
```

SHIMANO/BAS BASIC PROGRAM FOR THE MODEL 4 **Program Listing Number Three** by Parker Snap

```
10 'PROGRAM SHIMANO/BAS
20 CLS: PRINT "PREPARE PRINTER"
30 F$=INKEY$: IF F$="" THEN 30
40 LPRINT CHR$(27);CHR$(20): LPRINT CHR$(27);CHR$(81);CHR$(15)
50 LPRINT SPACE$(30);"Bicycle Gearing Display for 21-Speed Mountain Bike"
60 LPRINT SPACE$(32);"Purpose, to show possibilities of gear selection"
70 DIM CH(3),COG(5,7)
80 FOR J=1 TO 3: READ CH(J): NEXT J
90 FOR J=1 TO 5: FOR K=1 TO 7
100 READ COG(J,K): NEXT K: NEXT J
110 'CALCULATE THE RANGES FOR EACH SET OF COGS
120 GOSUB 330
130 FOR K=1 TO 5: LPRINT "RANGE; SET";K
140 FOR J=1 TO 3: LPRINT J;: LPRINT CHR$(8);: LPRINT CHR$(8);
150 FOR L=1 TO 7
160 LET GR=27*CH(J)/COG(K,L)
170 LET LIN=INT(GR)
180 PRINT INT(GR);
190 IF L=1 THEN LET LIN=LIN-3
200 FOR N=1 TO LIN: LPRINT " ";: NEXT N
210 LPRINT ":";
220 FOR N=1 TO 8*LIN+4: LPRINT CHR$(8);: NEXT N
230 NEXT L: LPRINT: PRINT
240 NEXT J: NEXT K
250 GOSUB 330
260 GOTO 390
270 DATA 26,36,46
280 DATA 12,13,14,15,16,17,19
290 DATA 13,14,15,16,17,19,21
300 DATA 13,14,15,17,19,21,24
310 DATA 13,15,17,19,21,23,26
320 DATA 13,15,17,18,21,24,28
330 LPRINT SPACE$(100);"1"
340 LPRINT SPACE$(19);
350 FOR N=2 TO 9: LPRINT N;SPACE$(7);: NEXT N: LPRINT " O"
360 LPRINT SPACE$(20);
370 FOR N=2 TO 10: LPRINT "O....:....";: NEXT N: LPRINT
380 RETURN
390 LPRINT CHR$(27);CHR$(81);CHR$(20)
400 LPRINT "CHAIN WHEELS:"CH(1);CH(2);CH(3)
410 LPRINT "REAR COG CLUSTER"
420 FOR J=1 TO 5: LPRINT "      SET";J;
430 FOR K=1 TO 7: LPRINT COG(J,K);: NEXT K
440 LPRINT: NEXT J
450 LPRINT CHR$(27);CHR$(81);CHR$(0): END
```

RULE/BAS BASIC PROGRAM FOR MODEL 4 Program Listing Number Four+ by Parker Snapp

```
10 'PROGRAM RULE/BAS
20 CLS
30 PRINT@(3,10),"HANDY TANDY RULERS"
40 INPUT "STANDARD (1) OR WIDE CARRIAGE (2)";W
50 IF W<1 OR W>2 THEN CLS: GOTO 40
60 INPUT "CONDENSED (1) ELITE (2) PICA (3)";P
70 IF P<1 OR P>3 THEN CLS: GOTO 60
80 PRINT@(15,10),"PREPARE PRINTER, THEN PRESS ANY KEY"
90 A$=INKEY$: IF A$="" THEN 90
100  ON P GOTO 110,160,210
110 S$="CONDENSED CHAR"
120 LPRINT CHR$(27);CHR$(20)
130 IF W=1 THEN X=13: Y=9: Z=4: G$=""
140 IF W=2 THEN X=16: Y=9: Z=7
150 GOTO 250
160 S$="ELITE (12 C P I)"
170 LPRINT CHR$(27);CHR$(23)
180 IF W=1 THEN X=9:: Y=9: Z=0: G$="....:"
190 IF W=2 THEN X=12: Y=9: Z=3
200 GOTO 250
210 S$="PICA (10 C P I)"
220 LPRINT CHR$(27);CHR$(19)
230 IF W=1 THEN X=8: Y=8: Z=0: G$=""
240 IF W=2 THEN X=10: Y=9: Z=1
250 LPRINT "I";: FOR I=1 TO X: LPRINT "....:....I";: NEXT I: IF W=1 THEN LPRINT G$;
260 LPRINT: LPRINT "O";: FOR J=1 TO Y: LPRINT SPC(9)CHR$(48+J);: NEXT J
270 FOR K=1 TO Z: LPRINT SPC(9)CHR$(49);: NEXT K: LPRINT: LPRINT " ";
280 FOR L=1 TO Y: LPRINT SPC(9)"O";: NEXT L
290 FOR I=1 TO Z: LPRINT SPC(9)CHR$(47+I);: NEXT I: LPRINT
300 LPRINT " ";: FOR K=1 TO 9: LPRINT SPC(10);: NEXT K
310 FOR L=1 TO Z: LPRINT SPC(9)"O";: NEXT L: LPRINT
320 LPRINT S$
330 CLS: GOTO 30
```



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MODEL 4 P

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by Leonard Lorden

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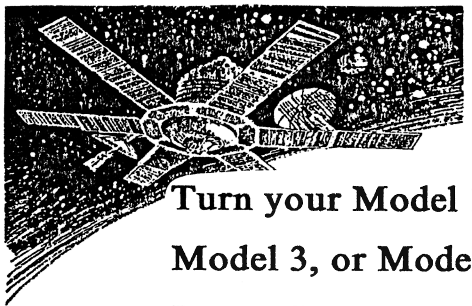

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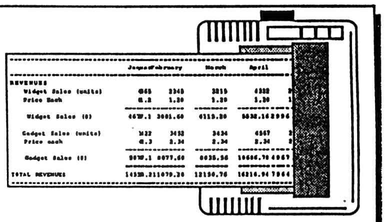

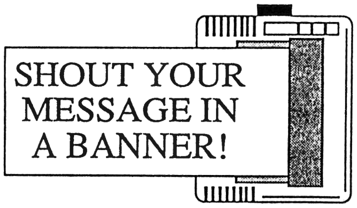
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TYPITALL Word Processor $ 49.95

Word processor upwardly compatible with SCRIPSIT -- it reads your old SCRIPSIT files and uses the same formatting and cursor movement commands. Send any control/graphics character to the printer. Print formatted text on the screen, or send it to a disk file for later printing. Merge data from a file during printing. Assign any sequence of keystrokes to a single control key. Call up to 16 help screens at any time. Move cursor forward or backward by character, word, line, paragraph or page. Complete with easy to read manual.

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Extends the dating capabilities on TRSDOS 6.2.x DOS disks to Dec 31, 1999 with full compatibility **with older, pre 6.3 DOS dating formats,** as well as the newer dating format for LS-DOS 6.3. Includes many optional **system patches, plus numerous useful** utilities. **$18**

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Model 4 Software

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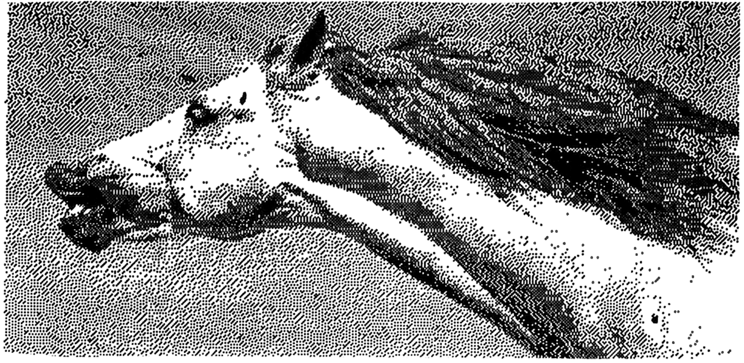

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PostMaster

Computer News 80

PostMaster by David P. Miller is a program that lets you create Posters, Letterheads and Mailing Labels with icons, borders, and many different character fonts using your dot matrix printer. The program runs on TRS-80 Model 4/4P/4D, with 64K or 128K of memory that has a MicroLabs or Radio Shack high resolution board installed.

This program has received the highest praise from reviewers of any program ever written for the Model 4. It allows you to use thousands of icons, borders, and fonts that are available from the File Cabinet Icon Library, it also allows you to add your own icons, borders and fonts.

Printers supported: Radio Shack DMP-130, -130A, -131, -132, -133, -430, -2100P, also any Radio Shack DMP printer with a 3-digit number with "3" as the second digit. All Epson and IBM printers. All other dot matrix printers that are Epson and IBM emulation printers. Seikosha SP-2000, -2000Plus, -2400. Okidata Microline 182 and 192. Panasonic KX-P1091, -1092, -1124, nonsuffixed. Star 10X, -15X, -NP, -NX, LC-10. C-ITOH 1510, 8510, C-130. (Note - Dot Matrix printers providing 300-dpi or 180-dpi may not work with PostMaster and no guarantees can be made concerning them.

Printers that are not supported are: Radio Shack DMP-110, -120, -400, -500, -2100. Panasonic suffixed printers 1124i, 1124e, etc. Okidata 82, 92, and Daisy wheel printers.

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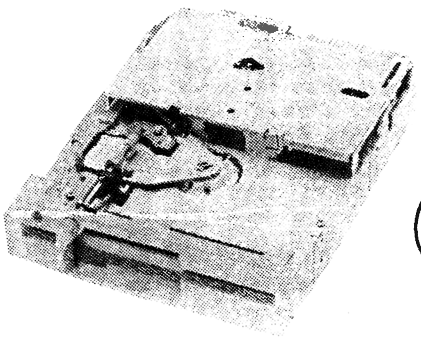

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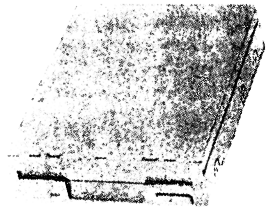

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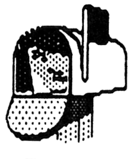

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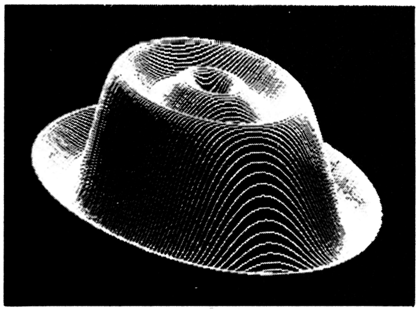

Superior Hardware. The Grafyx Solution provides 153,600 pixel elements which are arranged in a 640 × 240 or on the Model III a 512 × 192 matrix. Hundreds of new business, personal, engineering, and educational applications are now possible. The hi-res display can be shown on top of the standard display containing text, special characters, and block graphics. This simplifies program debugging, text labeling, and upgrading current programs to use graphics. The Grafyx Solution fits completely within any tape or disk based Model 4, 4D, 4P, or III. Installation is easy with the plug-in, clip-on Grafyx Solution board.

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Purchase a Grafyx Solution Hi-Res Graphics Board for $ 99.00 and receive a free copy of DRAW a powerful graphics program which allows drawing or designs to be easily created on a Model III/4/4P/4D.

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Specify Model 3, Model 4p,
Model 4 Gate Array, or
Model 4 Non Gate Array
when ordering. The boards
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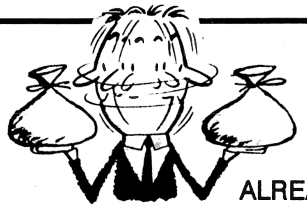

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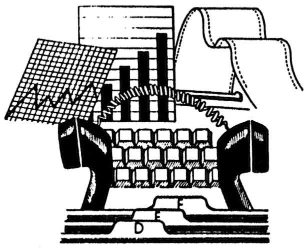

ANSITERM 4

by Richard VanHouten

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Supports ANSI (American National Standards Institute) and AVATAR control codes. IBM graphics and file transfer by X-modem or Y-modem.

System requires Model 4 with Modem and High Resolution Board.

Program complete with printed manual.

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Complete with all cables and

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36 Contact Centronics Male (Printers)	4.00
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34 Pin 17x2 Header Male/Plug No Mounting	7.50
34 Pin 17x2 Header Male/Plug W/Mounting	7.50
25 Pin DB25 (RS232) Male/Plug	3.00
25 Pin DB25 (RS232) Female/Socket	3.00
PC BOARD MOUNT	
34 Pin 17x2 Box Header - Straight Solder	2.50
50 Pin 25x2 Box Header - Straight Solder	4.50

CONNECTOR S&H
Add $ 2.00 Shipping and Handling if ordered alone.
Shipping and Handling included if ordered with other items.

EXTENSION BLOCKS AND FLAT CABLE

DESCRIPTION	PRICE
EXTENSION CONTACT BLOCKS	
34 Pin 17x2 PCB Socket - 3/16" High	5.50
34 Pin 17x2 PCB Socket - 5/16" High	5.50
34 Pin 17x2 PCB Socket - 5/8" High	5.50

EXTENSION S&H
Add $ 2.00 Shipping and Handling if ordered alone.
Shipping and Handling included if ordered with other items.

FLAT RIBBON CABLE	
25 Conductor	.38 per ft.
34 Conductor	.51 per ft.
50 Conductor	.75 per ft.

CABLE S&H
Add $ 3.00 Shipping and Handling if ordered alone.
Shipping and Handling included if ordered with other items.

CUSTOM CABLES BUILT UPON REQUEST
Call for price quotes.

TOP QUALITY PRINTER RIBBONS

Printer	Radio Shack	CN80	Type	Price Each for	
	Cat. Number	Number		One	6 or More
LP I, II, IV	26-1413	CN1001	FABRIC REFILL	5.55	5.05
LP III, V	26-1414	CN1002	FABRIC CART.	6.38	5.88
LP III, V	26-1414	CN1003	FABRIC REFILL	4.79	4.29
LP VI/VIII,DMP 400/420	26-1418	CN1004	FABRIC CART.	5.60	5.10
LP VII, DMP 100	26-1424	CN1038	FABRIC CART.	6.00	4.50
DMP 110	26-1283	CN1005	FABRIC CART.	6.58	6.08
DMP130/130A/132/133/107	26-1236	CN1006	FABRIC CART.	6.40	5.90
DMP130/130A/132/133/107	26-1238	CN1007	FABRIC REFILL	5.00	4.50
DMP 500	26-1482	CN1008	FABRIC CART.	13.40	12.90
DMP 120, 200	26-1483	CN1009	FABRIC CART.	7.00	6.50
DMP 120, 200	26-1489	CN1010	FABRIC REFILL	4.85	4.35
DMP 430	26-1296	CN1013	FABRIC CART.	12.25	11.75
DMP 440	26-2809	CN1014	FABRIC CART.	19.30	18.80
DMP 2100, 2100P, 2110	26-1442	CN1015	FABRIC CART.	6.10	5.60
DMP 2100, 2100P, 2110	26-1442	CN1016	FABRIC REFILL	4.85	4.35
DMP 2120	26-2834	CN1017	FABRIC CART.	13.05	13.05
DMP 2120	26-2836	CN1018	FABRIC REFILL	7.90	7.40
LMP 2150	26-1287	CN1019	FABRIC CART.	8.00	7.50
DWP II, DWP 410/510	26-1419	CN1020	MULTI-STRIKE CT.	5.35	4.85
DWP II, DWP 410/510	26-1419	CN1021	M-S REFILL	4.50	4.00
DWP II, DWP 410/510	26-1449	CN1022	FABRIC CART.	6.55	5.95
DWP II, DWP 410/510	26-1449	CN1023	FABRIC REFILL	5.45	4.95
DWP 520, 230, 210	26-1445	CN1024	MULTI-STRIKE CT.	5.15	4.65
DWP 520, 230, 210	26-1445	CN1025	M-S REFILL	4.50	4.00
DWP 520, 230, 210	26-1458	CN1026	FABRIC CART.	5.60	5.10
DWP 520, 230, 210	26-1458	CN1027	FABRIC REFILL	4.80	4.30
DWP 220	26-1299	CN1028	MULTI-STRIKE CT.	7.95	7.45
DWP 220	26-1299	CN1029	M-S REFILL	3.60	3.10
DMP 300/2102	26-2819	CN1030	FABRIC CART.	7.15	6.65
DMP 300/2102	26-2819	CN1031	LONG LIFE CART.	6.85	6.35
ALPS ASP-1000	900-2326	CN1032	FABRIC CART.	6.60	6.10
EPSON FX/MX/RX-80	900-2327	CN1033	FABRIC CART.	5.50	5.00
EPSON LX/80/90	900-2328	CN1034	FABRIC CART.	5.00	4.50
PANASONIC KXP1090	900-2331	CN1035	FABRIC CART.	6.10	5.60
PANASONIC KXP1090	900-2331	CN1036	LONG LIFE CART.	7.35	6.85
STAR MICRON. NX1000	900-2332	CN1037	FABRIC CART.	6.45	5.95
PANASONIC KXP1180/1190/1191		CN1039	FABRIC CART.	6.90	6.40
PANASONIC KXP1180/1190/1191		CN1040	LONG LIFE CART.	7.60	7.10
SEIKOSHA SP-2000		CN1041	FABRIC CART.	6.40	5.90
DMP 500		CN1043	FABRIC REFILL	5.30	4.80
DMP 430		CN1044	FABRIC REFILL	5.60	5.10
ALPS ALLEGRO 24		CN1045	FABRIC CART.	7.25	6.75

ALL RIBBONS ARE BLACK, CART.= Plastic Cartridge, REFILL= Refills Only/No Cartridge.

Add for Shipping and Handling

1 to five items add (Y) .... 6 or more items add (Z)
Please refer to the CN80 Product Guide Shipping and Handling Schedule.

Some ribbons for the older Radio Shack printers are not stocked, but are still available by special order, please allow an additional week shipping time. All stock ribbons are shipped within 24 hours from the time the order is received. C.O.D orders accepted. Government and educational institution purchase orders are accepted. Sorry, we do not accept credit card orders.

Computer News 80 Product Guide

BACK ISSUES, INDEX, & REPRINTS

CN80 BACK ISSUES Individual Copies $ 4.00 (V)
Available from Vol 1 No. 1 January 1988
All of 1988 Bound $ 18.00 (Z)
All of 1989 Bound $ 20.00 (Z)
All of 1990 Bound $ 22.00 (Z)
All of 1991 Bound $ 24.00 (Z)

CN80 INDEX on Disk $ 2.00 (V)
Complete index for CN80 1988 thru 1991.
24 classifications of search.
Specify LSDOS 6.3 or TRSDOS 1.3

CN80 NEWCOMERS GUIDE VOL 1 $ 7.95 (V)
Reprint of all CN80 "Newcomers Corner" part 1 to 8.

CN80 DISK SERIES $ 5.00 each (V)

NUMBER 1
All the programs printed in Vol 1 No. 1 thru No. 6.
NUMBER 2
All the programs printed in Vol 1 No. 7, 8 and 9.
NUMBER 3
All the programs printed in Vol 1 No.10, 11 and 12.
NUMBER 4
All the programs printed in Vol 2 No.1, 2 and 3.
NUMBER 5
All the programs printed in Vol 2 No.4, 5 and 6.
NUMBER 6
All the programs printed in Vol 2 No.7, 8 and 9.
NUMBER 7
All the programs printed in Vol 2 No.10, 11 and 12.
NUMBER 8
All the programs printed in Vol 3 No.1, 2 and 3.
NUMBER 9
All the programs printed in Vol 3 No.4, 5, and 6.
NUMBER 10
All the programs printed in Vol 3 No.7, 8, and 9.
NUMBER 11
All the programs printed in Vol 3 No.10, 11, and 12.
NUMBER 12
All the programs printed in Vol 4 No. 1, 2, and 3.
NUMBER 13
All the programs printed in Vol 4 No. 4, 5, and 6.
NUMBER 14
All the programs printed in Vol 4 No. 7, 8, and 9.
NUMBER 15
All the programs printed in Vol 4 No. 10, 11 and 12.
NUMBER 16
All the programs printed in Vol 5 No. 1, 2 and 3.
NUMBER 17
All the programs printed in Vol 5 No. 4, 5 and 6.
NUMBER 18
All the programs printed in Vol 5 No. 7, 8 and 9.
NUMBER 19
All the programs printed in Vol 5 No. 10, 11 and 12.
NUMBER 20
All the programs printed in Vol 6 No. 1, 2 and 3.
NUMBER 21
All the programs printed in Vol 6 No. 4, 5 and 6.
NUMBER 22
All the programs printed in Vol 6 No. 7, 8 and 9.
NUMBER 23
All the programs printed in Vol 6 No. 4, 5 and 6.

For your convenience advance orders for the Disk Series are accepted. Disks are shipped to you automatically as soon as they are ready. Write or call for free CN80 Disk Series Catalog.

PLEASE NOTE: All CN80 DISK SERIES are on FLIPPY 5-1/4"disks; TRS/LS-DOS 6.3 format on Side 1 and TRSDOS 1.3 format on Side 2. Also available on 3-1/2" disks @ $5.50 each (LSDOS 6.3.1 or LDOS 5.3.1 format only). Each Disk Series has Bonus programs.

MANUALS & PROGRAMS PUBLISHED BY CN80

MARK REED'S MOD 4 UTILITY DISK $ 14.95 (Y)
Sixteen useful utilities for every Model 4 owner.

MARK REED'S MODEL 4 ED-IT $ 17.95 (Y)
For TRSDOS 6.2 or LS-DOS 6.3. New full-screen text editor. Powerful enough for a programmer yet simple enough for the causal user.

PATCH UTILITY PROGRAM FOR TRSDOS 1.3 $ 10.00 (V)
by Henry H. Herrdegen. This program contains all the patches for TRS-DOS 1.3, patches for Scripsit, and for "Profile III+, plus program to install the patches.

Z80 MACHINE LANGUAGE TECHNIQUES $ 22.95 (Z)
For the TRS-80 by Don Ady. 236 8-1/2 x 11 pages. "Presenting all the required fundamentals of Machine Language Programming, with practical applications."

PACK for Model 1/3/4 $ 17.95 (Y)
BASIC Program Packer by David Goben.

PACK - MS-DOS Version $ 17.95 (Y)
BASIC Program Packer by David Goben.

DEA Disk Editor and Assembler $ 49.85 (Z)
For Mod I/III/4 by David Goben. Extends your computing power and Assembling Language editing and assembling. 118 Pages 8-1/2 x 11 format.

T62DOSXT Upgrade TRS 6 Dating $ 18.00 (X)
by David Goben. Extends TRSDOS 6.x date entry beyond Dec. 31, 1987, patches & utility programs.

BUSY-CALC Spreadsheet Program $ 79.95 (Z)
by David Goben. Small business & family spreedsheet program. Model 4/4P/4D; TRSDOS 6.x, LSDOS 6.3.x.
BUSY-CALC DEMO DISK ONLY $ 10.00 (V)
Redeemable against purchase price of BUSY-CALC.

BCX Spreadsheet Program $109.00 (Z)
by David Goben. For Model 4's with Extended Memory (minimum of 128k required).
BCX DEMO DISK ONLY $ 15.00 (V)
Redeemable against purchase price of BCX.

DAVID'S MODEL 3 FILE UTILITIES $ 9.00 (Y)
by David Goben. Eight powerful programs for LDOS 5.x.

DAVID'S MODEL 3 SYSTEM UTILITIES $ 16.00 (Y)
by David Goben. 14 powerful programs designed for use with LDOS 5.x systems.

DAVID'S MODEL 4 FILE UTILITIES $ 9.00 (Y)
by David Goben. Nine powerful programs that save hours of work for TRS/LSDOS 6.x systems.

DAVID'S MODEL 4 SYSTEM UTILITIES $ 16.00 (Y)
by David Goben. 16 powerful programs designed for use with TRS/LSDOS 6.x systems

SCRIPT Word Processor $ 37.95 (Y)
for Model I, III, or 4/4P/4D by David Goben.
Specify Version when ordering:
- Model III TRSDOS 1.3
- Model I or III LDOS
- Model I NEWDOS/80 v 1
- Model I or III NEWDOS/80 v 2
- Model 4/4P/4D TRSDOS/LSDOS 6.X
- Model 4/4P/4D DOSPLUS

SCRIPT SPELLING VERIFIER $ 37.95 (Y)
by David Goben.
SUPERSCRIPSIT SPELLING CHECKER $ 37.95 (Y)
by David Goben.
Specify version when ordering Spellers
Model I, III, 48k, 2 disk drives minimum required.
Model 4 64k, 2 disk drives minimum required.
MODEL 3 FBACKUP by David Goben $ 15.00 (Y)
LDOS 5.x. Very fast and versatile backup utility.
MODEL 4 FBACKUP by David Goben $ 15.00 (Y)
Very fast and versatile backup utility for Model 4.
MODEL 3 FASTBACK by David Goben $ 29.95 (Y)
LDOS 5.x systems. Very fast hard drive backup prg.
MODEL 4 FASTBACK by David Goben $ 29.95 (Y)
TRS/LSDOS 6.x systems. Very fast hard drive prg.
MODEL 3 FFORMAT by David Goben $ 15.00 (Y)
Fast FORMAT for Model 3 using LDOS 5.3.x.
MODEL 4 FFORMAT by David Goben $ 15.00 (Y)
Fast FORMAT for Model 4 using LSDOS 6.3.x.
HARD DISK BUILDER by David Goben $ 10.00 (V)
Build your own hard disk driver.
HI-RES UTILITIES PACKAGE by David Goben $ 15.00 (Y)
Nine utilities to perform general graphics
maintenence from DOS ready.
POSTMASTER SUPPORT UTILITIES by D.Goben $ 39.00 (Z)
Ten programs create icons for PostMaster.
POSTMASTER 24 by David Goben $ 15.00 (Y)
Utility programs allow PostMaster
by David Miller to be used on a 24 pin dot matrix.
SUBDIRCTORY by David Goben $ 19.95 (Y)
Build subdirectories on hard drives or floppies.
DISKOPT UTILITY PACKAGE by David Goben $ 29.95 (Y)
Disk optimoizer and file defragmenter for
hard drives or floppy disk drives. Super fast.

REMBRANDT Graphics Toolkit $ 39.95 (Z)
by Spectre Technologies. Graphic software for Mod
4/4D/4P, TRSDOS/LSDOS, hi-res board is not required.
LONG & LOUD Sideways & Banner $ 34.95 (Z)
by Spectre Technologies. Mod 4/4D/4P TRSDOS/LSDOS,
Order both Rembrandt and Long & Loud for $ 67.50 (Z)

ASTROCAL by Vernon B. Hester $ 29.95 (Z)
Turn your Model 1, 3, 4/4P/4D in to a programmable
calculator. Manual and diskette w/built-in operating
system, ready to run. Specify computer Model 1,3,4.

TRSCAN by J.F.R. Slinkman $ 45.95 (Z)
Scanner program for Chinon DeskScan 2000 with Model
4 using LSDOS 6.3.0 or 6.3.1.

ROMCLOCK3 UTILITY PACKAGE $ 5.00 (Y)
by David Goben. Clock operating system for SmartWatch
or No Slot Clock LDOS 5.3.1 version.

ROMCLOCK4 UTILITY PACKAGE $ 5.00 (Y)
by David Goben. Clock operating system for SmartWatch
or No Slot Clock TRS/LS 6.3.1 version.

POSTMASTER $ 40.00 (Y)
by David P. Miller Make labels, letterheads
Posters with a variety of Fonts and picture Icons.

ARRANGER II $ 39.95 (Y)
by Dan Foy. Disk index program for TRS-80 Model I,
III, 4/4D/4P. Automatically recognizes all major TRS-80
disk operating system formats.

ANSITERM 4 by Richard VanHouten $ 30.00 (Y)
TRS-80 Mod 4 High Resolution Communications
Program. Supports ANSI & AVATAR control codes, IBM
graphics, & file transfer by X or Y modem.
Hi-Res board required.

MINE FIELD by Richard VanHouten $ 12.00 (Y)
Game program, find all the mines in
a mine field without setting one off.

IDIM by Leonard J. Lorden $ 80.00 (Y)
Model 4 BBS Host System Program. Build your own
custom Bulletin Board.

MOUSEDOS by Leonard J. Lorden. $ 25.00 (Y)
Build your own DOS command menu with the cursor
operated by a mouse. Easy to set up, easy to use.

GIF4MOD4 $ 37.95 (Y)
by J.F.R. Slinkman. Send or receive GIF hi-res graphics
to & from different types of computers with your Mod 4.

SLOT4 $ 14.95 (Y)
by J.F.R. Slinkman. Accurate simulation of 1930's Mills
slot machine. True revolving dials, moving handle,
and realistic sound effects. Mod 4 & Hi-Res required.

VIDPOKR4 $ 19.95 (Y)
by J.F.R. Slinkman. Play real video poker on your
computer. Remarkable screen renditions of playing cards.
Mod 4, 128k, & Hi-Res required.

The CN80 MOUSE HOUSE PRODUCTS
MOUSE+ DRIVER by David Goben $ 10.00 (Y)
Complete Mouse Driver Program and manual for 2 or 3
button mice for Model 4. Write your own mouse
programs in BASIC or program language.

M T K by David Goben $ 18.00 (Y)
Mouse to Keyboard Interface program w/manual for 2 or
3 button mice for Model 4. MOUSE DRIVER Required.

THREE BUTTON MOUSE $ 26.95 (Z)
Three button mouse and adapter for RS-232 connection.
NOTE: Model 4s w/RS-232 connector pointing down
require an Extender Cable $8.00 + $2.00 S&H.

CN80 COMBINATION MOUSE PACKAGE
M4s w/RS-232 connector out the back $ 52.95 (Z)
M4s w/RS-232 connector on the bottom $ 59.95 (Z)
Includes: 3 button mouse w/adapter, and extender cable
if needed (see pricing above), Mouse+ Driver program
and M T K Interface program.

MOUSE HOUSE HOLSTER $ 1.75 (X)
Holds mouse on side of computer out of the way.

MOUSE PAD $ 2.45 (Y)
Better Mouse control, foam pad nonslip surface.

MOUSE CABLE ADAPTERS $ 2.95 (W)
Male 9 pin to Male 25 pin

BOOKS
DISK INTERFACING GUIDE/MOD I $ 1.85 (V)
by William Braden Jr. Out of print book.
101 COMPUTER BUSINESS IDEAS $ 7.95 (A)
by Wally Wang. "If you'd like your computer to work for
you-and help you earn money-this is the book to read."
HOW TO GET STARTED WITH MODEMS $ 8.95 (A)
by Jim Kimble. "...covering everthing the beginning
modemer needs to know-from purchase and installation".
SIMPLE COMPUTER MAINTENANCE & REPAIR $ 2.95 (A)
by Wally Wang and Scott Millard. "...understandable,
inexpensive and easy maintenance solutions.
THE OFFICIAL COMPUTER WIDOW'S $ 7.95 (A)
(and Widower's) HANDBOOK by Experts on "Computer
Widow/Widowerhood. Enjoyable...Funny...Perfect gift.
ROOKIE PROGRAMMING $ 8.95 (A)
by Ron Dippold. Introduction to programming for
beginners and newcomers. BASIC, C and Pascal.

LASER and DOT MATRIX PRINTER DRIVERS
ALLWRITE HP LASER SUPPORT $ 20.00 (Y)
PACKAGE, Model 4/4P/4D

ALLWRITE DESKJET SUPPORT PACKAGE, Model 4/4P/4D	$ 20.00 (Y)
SUPERSCRIPSIT HP LASER DRIVER Model I,III,4/4P/4D	$ 20.00 (Y)
SCRIPSIT PRO HP LASER DRIVER Model 4/4P/4D	$ 20.00 (Y)
SUPERSCRIPSIT FX80 DRIVER Model I,III,4/4P/4D	$ 17.95 (Y)
SCRIPSIT PRO FX80 DRIVER Model 4/4P/4D	$ 17.95 (Y)

LASER SOFT FONT PACKAGES

SPECIFY WORD PROCESSOR:
SuperSCRIPSIT for the Model III
SuperSCRIPSIT for the Model 4
Scripsit PRO for the Model 4

Font style	Point Size (Height of Letter)
Century	10 point
Amertype	10 point
Legal	10 point
Helvetica	10 point
Optimas	10 point
Palitine	10 point
Times Roman	10 point
Palitine	12 point
Centrum	12 point
Optimis	12 point
Helvetica	12 point
Palitine	8 point

Each Font Package supports normal, bold and italics printing of letters. Thirty-six soft font packages in all, Twelve soft fonts for each word processor supported.

Prices are $10 for each soft font package, plus (Y)
Discounts for multiple font orders are:
5 Font Packages for $ 45.00 (Z)
10 Font Packages for $ 90.00 (Z)
12 Font Packages for $ 96.00 (Z)

FILE CABINET CATALOGS

MODEL 4 TRS-80 PUBLIC DOMAIN	$ 2.00 (V)
MODEL 4 HIGH RESOLUTION	$ 2.00 (V)
MODEL 4 MACPAINT HIGH RESOLUTION	$ 2.00 (V)
TRS-80 MODEL 1/3 PUBLIC DOMAIN	$ 2.00 (V)
SYMPHONY 90 MUSIC LIBRARY CATALOG	$ 3.00 (V)

SYMPHONY 90 MUSIC SYSTEMS FOR THE MODEL 4

SYMPHONY 90 COMPOSER SYSTEM	$ 39.95 (Z)
Specify Model 4 or Model 3 Version	
SYMPHONY 90 PLAYER SYSTEM	$ 17.95 (Z)
Specify Model 4 or Model 3 Version	
SYMPHONY 90 MUSIC INTERFACE UNIT WITH AMPLIFIER	
Sold only with Composer or Player program.	
Interface and Composer System	$114.00 (Z)
Specify Model 3 or Model 4 Versions.	
Interface and Player System	$ 92.00 (Z)
Specify Model 3 or Model 4 Versions.	
Y CABLE	$ 18.00 (Y)
50 pin edge-card connectors. Enables hard drive and Symphony 90 (or ORC 90) to be used at the same time.	

TRSLINK LIBRARY DISKS

TRSLINK issue 1 to 48 only	$ 1.50 (W)
(5-1/4" LSDOS 6.3 or 5-1/4" TRSDOS 1.3)	
Complete set 1 to 48 $ 36.00 (Z) (Flippy Disks Only)	

SPECIALTY PROGRAM

SPECTECH Disk#1	$ 5.00 (V)
A collection of electronic and other formula programs.	

DISK OPERATING SYSTEMS (DOS)

TRSDOS 1.3 R/S Cat # 26-0312	$ 7.00 (X)
Model 3, Disk Operating System and BASIC	
LDOS 5.3.1	$ 39.95 (Y)
Model 3 Disk Operating System and Basic Interpreter.	
LS-DOS 6.3.1 R/S Cat # 700-2297	$ 39.95 (Y)
Model 4 Disk Operating System and Basic Interpreter	

LABELS

One Wide Labels for Mail or Disks Pressure Sensitive, Quality Guaranteed.

3-1/2 x 15/16 Plain Permanent Mailing Labels	
1000 per package	$ 4.22 (B)
5000 per Box (One Box)	$ 11.95 (B)
More than one 5000 pc. box	$ 10.95 (B)
3-1/2x 1-7/16 Plain Permanent Mailing Labels	
1000 per package	$ 5.25 (B)
5000 per box	$ 22.95 (B)
More than one 5000 pc. box	$ 20.66 (B)
4 x 1-7/16 Plain Removable Labels	
1000 per package	$ 7.45 (B)
5000 per box (One Box)	$ 26.95 (B)
More than one 5000 pc. box	$ 24.95 (B)
4 x 1-7/16 Plain Permanent Mailing Labels	
1000 per package	$ 5.25 (B)
5000 per box (One Box)	$ 22.95 (B)
More than one 5000 pc. box	$ 20.66 (B)

DISKETTES

FLOPPY DISKS	$ .40 (C)
5-1/4 Double/Single Sided Disks DD. 100% Error Free Lifetime Guarantee with Paper Sleeves, Labels & Read/Write Tabs.	
FLIPPY DISKS	$ .60 (C)
5-1/4 Single Sided DD on both sides. Premium Quality with two notches by factory. American made by Name brand mfg. 100% Error Free. With Paper Sleeves, Labels & R/write Tabs.	
3-1/2" DISKS	$ .69 (D)
Premium Quality DS/DD by Major US mfg. Complete with sleeves and labels, 100% Error Free, Lifetime Warranty. American Made - Bulk Platinum Brand by Syncom.	
5-1/4" TYVEK SLEEVES (25 per pk)	$ 1.25 (U)
COLOR CODED DISK LABELS	
Five Color 5.25 Write-On Disk Labels	
10 labels w/10 read-write tabs per sheet	
100 per package	$ .50 (U)
FLOPPY DISK MAILERS	
Self-Sealing Mailer package of 10	$ 3.35 (Y)
Holds one or two 5-1/4 floppy disks.	

SELECTOR SWITCHES

A-B SWITCH, PARALLEL	$ 18.75 (Z)
With three female 36 conductor centronics connectors.	
A-B SWITCH, SERIAL, RS232	$ 18.75 (Z)
With three DB25 Female connectors.	
THREE POSITION SERIAL SWITCH	$ 20.95 (Z)
w/4 DB25 Female connectors	
FOUR POSITION SERIAL SWITCH	$ 22.95 (Z)
w/5 DB25 Female connectors.	

CABLES REQUIRED BETWEEN AB SWITCH and PRINTER

Printer to Selector Switch 6'	$ 13.49 (E)
Printer to Selector Switch 10'	$ 15.95 (E)
Printer to Selector Switch 15'	$ 18.95 (E)

RS232 SERIAL CABLES

RS232 Serial Cable 6 ft. Equal to Radio Shack #26-240, Male - Female	$ 8.95 (E)
RS232 Serial Cable 6 ft. Equal to Radio Shack #26-249, Male - Male	$ 8.95 (E)
RS232 NULL MODEM Cable 6 ft Connect two computers together.	$ 9.95 (E)
RS-232 EXTENDER CABLE For computers w/RS-232 connector pointing down on the bottom of the computer.	$ 8.00 (Y)

HARD DRIVE CABLES

HARD DRIVE CABLE 4 ft w/50 pin Edge Card connector & H D pin connector.	$ 16.00 (Y)

PRINTER CABLES for TRS-80 & 1000 COMPUTERS

Flat Ribbon 6', Mod III/4/4D&P Printer Cable	$ 12.95 (E)
Flat Ribbon 12', Mod III/4/4D&P Printer Cable	$ 15.00 (E)

DISK CLEANING, DUST COVERS

5-1/4" DISK DRIVE CLEANING KIT	$ 4.90 (Y)
3-1/2" DISK DRIVE CLEANING KIT	$ 5.25 (Y)
UNIVERSAL PRINTER DUST COVERS For printers up to 16" wide, anti-static vinyl, soft tear-resistant, elastic bottom.	$ 9.75 (Y)

INTERNAL HALF HEIGHT DOUBLE SIDED DISK DRIVES

Internal Half Height 5-1/4 360K	$ 67.00 (Z)
Internal Half Height 3-1/2 720K	$ 67.00 (Z)
Half Height Filler Plate	$ 4.00 (V)
Internal 2 Drive Cable Specify: Model 4 Gate Array or Non-Gate Array. Model 4D or 4P. S&H included when ordered with drives.	$ 10.00 (X)

EXTERNAL HALF HEIGHT DOUBLE SIDED DISK DRIVES COMPLETE WITH CASE AND POWER SUPPLY

One Disk Drive Unit One 5-1/4 360K or One 3-1/2 720K Unit.	$143.00 (S)
Two Disk Drive Unit Two 5-1/4 360K drives, or two 3-1/2 720K drives. Or one 5-1/4 360K and one 3-1/2 720K drive.	193.00 (S)

MEMORY CHIPS for MODEL 4

64K UPGRADE KIT Includes 8 150ns 128 refresh cycle dynamic ram chips, plus instructions and Memory Test Disk.	$ 12.95 (Z)
64K 120ns CHIPS 120ns 128 refresh cycle chips. 16 chips are required for use w/Anitek Speed Up Kits. Includes installation instructions and Memory Test Disk.	$2.75ea (Z)
PAL CHIP Required to upgrade Non-Gate Array Model 4s.	$8.00ea (V)

MICRO-LABS HIGH RESOLUTION BOARDS

GRAFYX SOLUTION for Model 3/4/4P/4D Free Draw Program included. Specify Model when ordering because the boards are different for each Model. Model 3, Model 4P, Model 4 Non-Gate Array or Model 4 Gate Array.	$99.00 (Z)

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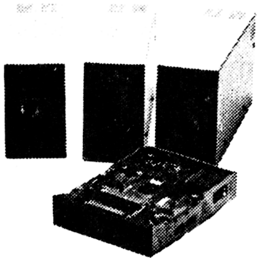

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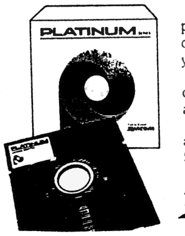

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